

# THE IRON AGE

New York, July 27, 1916

ESTABLISHED 1855

VOL. 98: No. 4

## Pacific Coast Steel Company's Plants

Open-Hearth Equipment and Bar  
and Structural Steel Rolling Mills  
at South San Francisco and Seattle

WITH a steel-making capacity of over 125,000 tons of ingots per year, and rolling mills at both San Francisco and Seattle, Wash., the Pacific Coast Steel Company has made the steel-producing industry of the Western slope of the United States of considerable importance. Since the outbreak of the European war, it built the steel plant at Seattle, up to that time operating a bar iron rolling mill, and it has doubled the capacity of its San Francisco works, besides going into the rolling of structural shapes in addition to merchant and reinforcing concrete bars. It has done a very considerable business

cent in sulphur, is the heat source for the open-hearth furnaces.

The San Francisco plant is at South San Francisco, 9 miles south of the city on the coast line of the Southern Pacific Railroad. It has now three 30-ton basic open-hearth furnaces and two of 40 tons capacity, and it is understood that contracts have already been closed for two 60-ton furnaces. The plant was built in 1911 and the first steel was made Jan. 2, 1912.

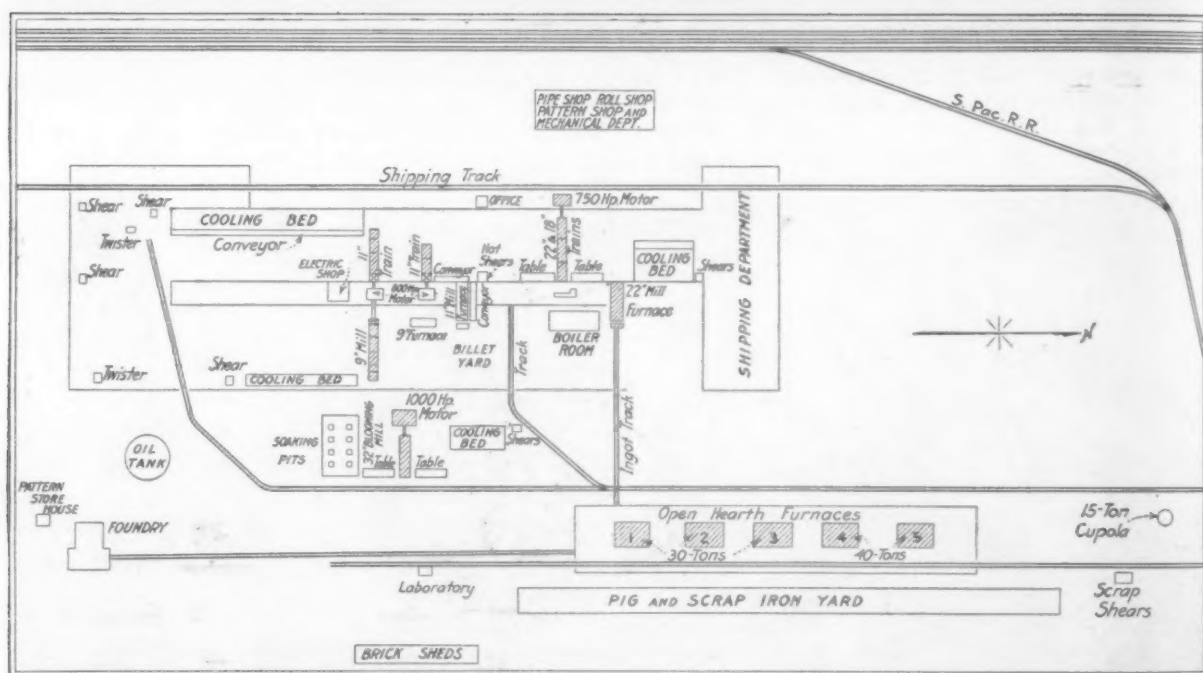
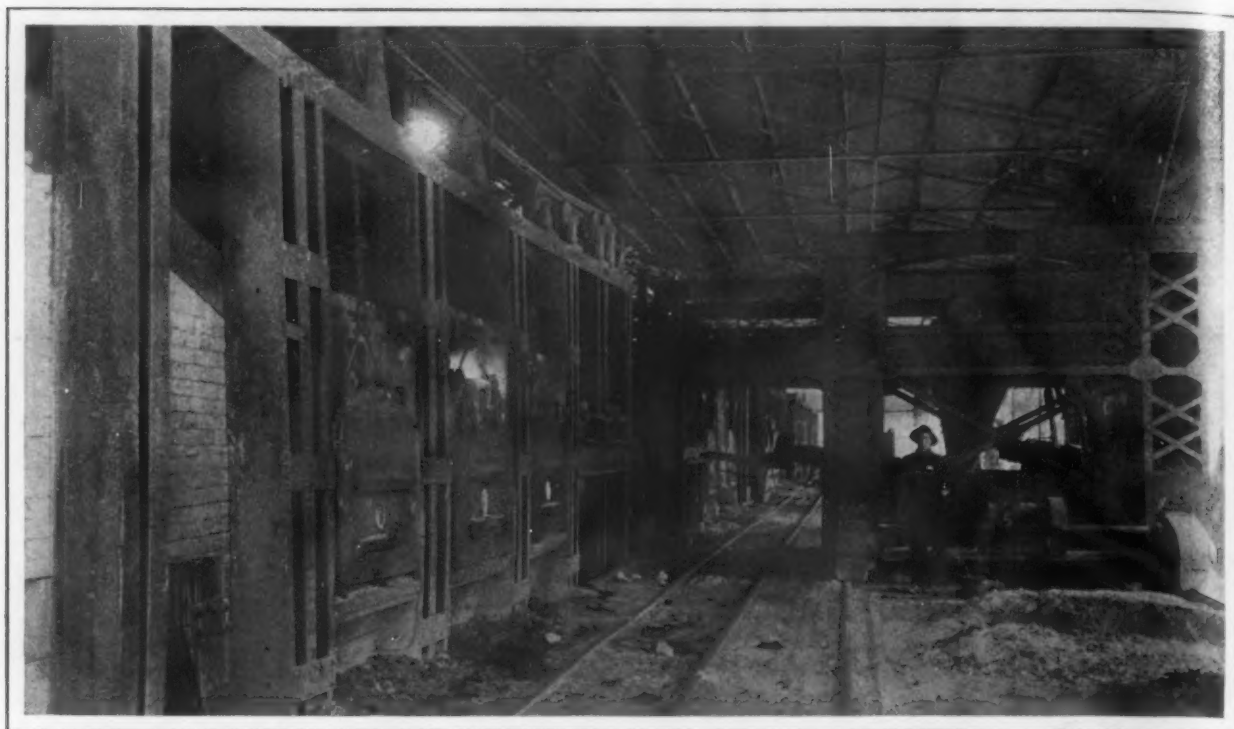
The charging floor of the open-hearth building is 30 ft. wide and the pouring aisle 45 ft. wide. The open-hearth charging machine was built by the



At Present There Are Five Oil-Burning Open-Hearth Furnaces at the South San Francisco Plant and Bottom Pouring of Ingots in Groups is the Regular Practice

with the Orient, particularly since the war, and has contributed largely to the development of concrete structures on the Coast. For raw materials Chinese pig iron has been used for some time, and the considerable quantity of old iron and steel collected on the Pacific Coast has, of course, been a factor. Prior to the war Scotch coke, running less than  $\frac{1}{2}$  per cent in sulphur and 6 to 7 per cent ash, was imported, but for fuel, oil, running not over 1 per

Wellman-Seaver-Morgan Company, Cleveland, and 50-ton pouring ladles are used, handled by a 40-ton Niles electric crane and a 75-ton Morgan crane. The smaller size ingots are commonly broken down in a 22-in. mill, being discharged by means of a hydraulic mechanism to a reheating furnace, which is oil-burning, and which delivers upon the approach table of the 22-in. mill. For the larger ingots soaking pits have been provided, and a 32-in. blooming



General Plan and Charging Side of Open-Hearth Furnaces of South San Francisco Plant

mill represents one of the late developments of the South San Francisco plant.

The 22-in., the 18-in. and the 11-in. mills are contained in a steel building 40 x 500 ft. in size. The 22-in. mill is a one-stand mill driven by an 800-hp. Corliss compound engine. Alongside of it is the 18-in. mill in two stands, also of three high rolls, and these three stands are commanded by a traveling tilting table. The 18-in. mill is designed to roll large angles, rounds, squares and flats, and the continuous furnace is 71 ft. long with a heating capacity in 10 hr. of 250 ingots 10 in. square. The two stands of the 18-in. mill are driven from a 750-hp. Allis-Chalmers motor. Angles 6 x 4 in. and flats 1 in. thick are about the largest sizes rolled.

The 11-in. mill is in five stands, in the Belgian arrangement, motor driven with the roughing and first stand coupled to an 800-hp. Crocker-Wheeler motor and the remaining stands coupled to a 750-hp.

Allis-Chalmers motor. A continuous furnace 41 ft. long supplies this mill. It is rated at 450,000 lb. of 1-in. square bars in 9 hr., and the cooling bed is 200 ft. long.

The 9-in. mill shown in the general plan of the South San Francisco works is of five stands and was built by the Lewis Foundry & Machine Company. A 30-ft. four-door heating furnace is provided and 120 ft. of cooling bed. This mill is driven by a 750-hp. Allis-Chalmers motor and is rated at 60,000 lb. per turn.

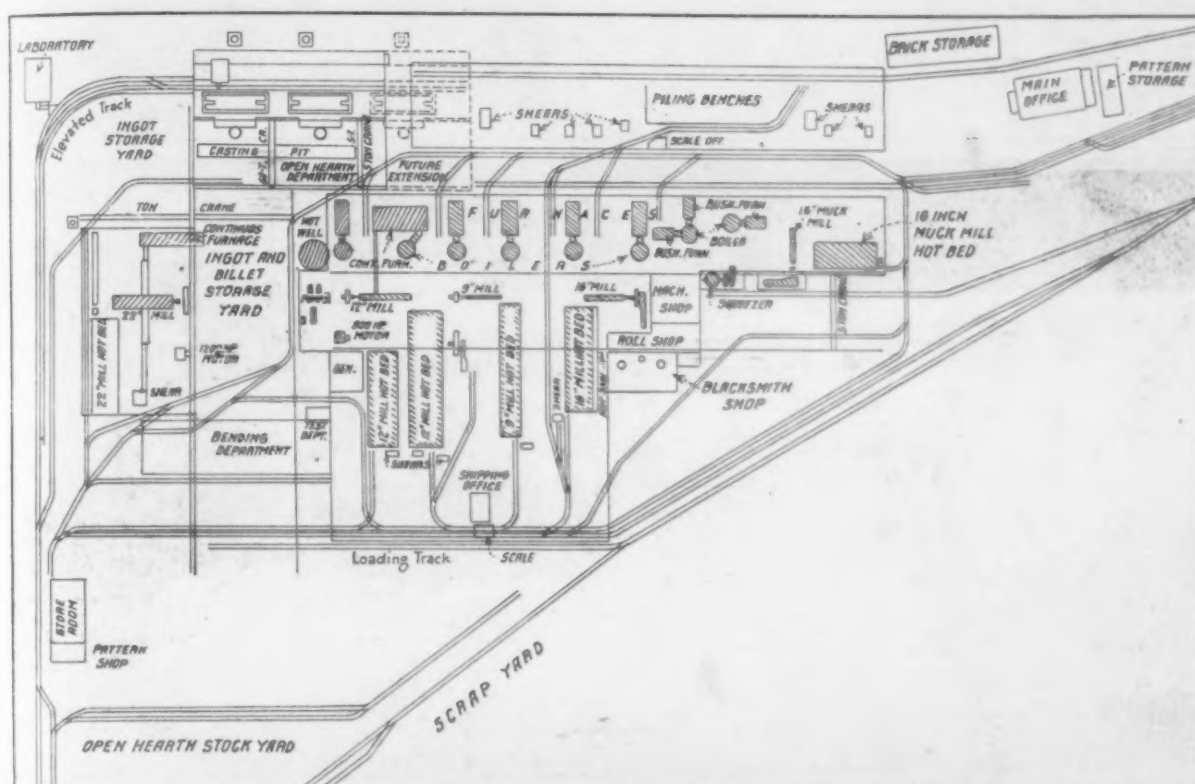
With the new blooming mill the plan is to roll steel beams and channels up to 15 in. in depth, and in general all types of beams and channels. In the smaller sizes of bars, the plant has, of course, specialized for some time in corrugated square and round bars and in twisted square bars, largely for reinforced concrete construction. That there is a considerable demand for reinforced concrete work is indicated by some recent statistics. In 1914 100

concrete bridges were built by the counties of California against 10 bridges 10 years previous. The cement industries in California in 1891 produced some 5000 bbl., while in 1912 the production mounted to 6,198,624 bbl.

The works of the Seattle plant are located on a 40-acre plat of Seattle tide land with a 500-ft. frontage on the west waterway of Seattle harbor and with switch spurs from the Northern Pacific, the Chicago, Milwaukee & St. Paul, the Great Northern and the Union Pacific railroads. The works are located at what is known as the Youngstown station of Seattle.

As indicated by the accompanying plan, which shows also the equipment for making bar iron, the

plant has two 40-ton basic open-hearth furnaces, one 22-in. structural and billet mill, one 16-in. bar mill, one 16-in. muck bar mill, one 12-in. merchant mill, one 9-in. guide mill and one 14-in. merchant mill in the course of construction. The first mill at this site was built in 1904-5 but as a steel plant the first cast was made Sept. 30, 1915. The plant has an iron-bar mill which was formerly owned by the Seattle Steel Company, which operated it up to Jan. 1, 1912, and its conversion to an open-hearth plant was undertaken by the Pacific Coast Steel Company, which had also acquired the Irondale Works at Irondale, Wash., formerly owned by the Western Steel Corporation. From the Irondale plant some of the open-hearth equipment and the



General Plan and Charging Side of Open-Hearth Furnaces of Youngstown Plant, Seattle, Wash.



22-in. mill were obtained. Besides merchant steel bars and structural shapes, the plant is capable of turning out T-rails up to 20 lb. per yard.

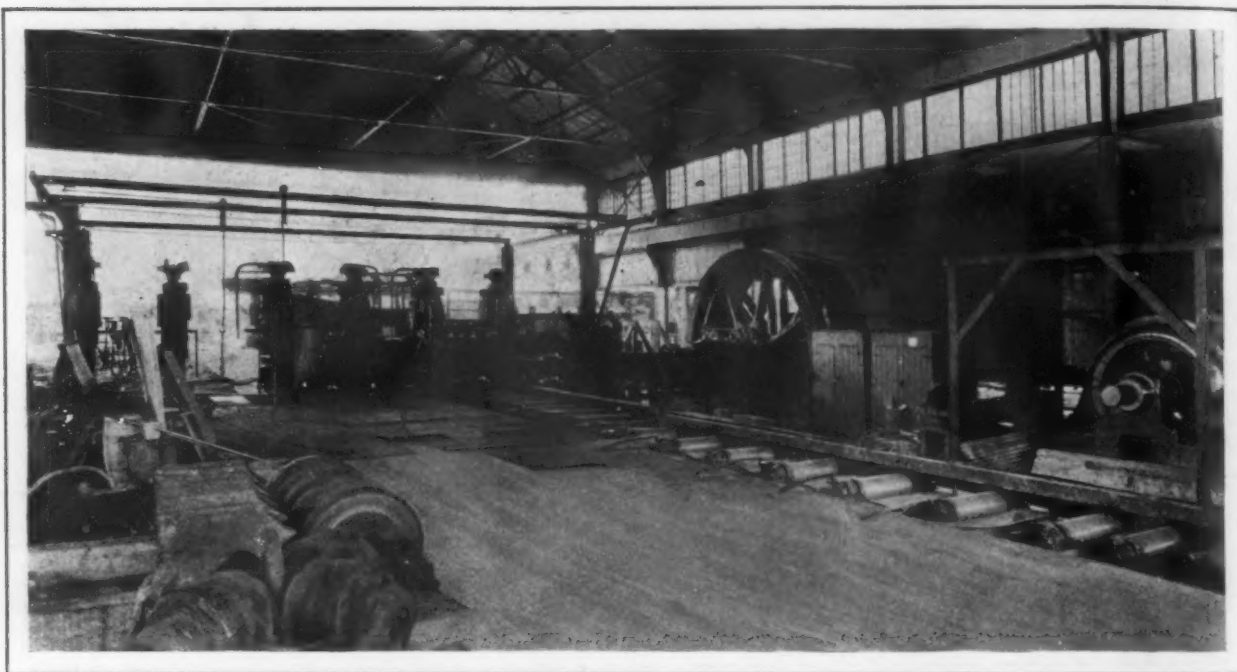
The open-hearth building of the Seattle works is constructed of steel and reinforced concrete. The furnaces were designed by Alex Laughlin & Co., Pittsburgh, and they are served by a Shaw electric 60-ton ladle crane with 5-ton 50-ft. span auxiliary hoist and one 5-ton 50-ft. span Shaw electric crane operating on the same track for taking care of the ladle work and the pouring pits. The charging floor is equipped with a Wellman-Seaver-Morgan charging machine.

The 22-in. structural mill is a three-stand three-high mill, rope driven from a 1200-hp. Allis-Chalmers 3-phase, 2300-volt alternating-current motor operating at 440 r.p.m., 23 $\frac{7}{8}$ -in. Jupiter ropes driving the mill at 82 r.p.m. being used. A Laughlin design continuous furnace and an 8 x 8-in. Lewis Foundry & Machine Company's shear for the hot

Serving the entire length of the three mills described is a 5-ton, 60-ft. span Shaw electric crane used for changing rolls and handling all the work incidental. The roll turning shop is equipped with three-roll turning lathes and the machine shop with two engine lathes, two drilling machines, two shaping machines and one planing machine. The blacksmith shop has four fires. There is a complete laboratory included in the equipment of the plant, and the yards are traversed by a Brown hoist traveling yard crane with electric magnet for handling scrap and other materials and two narrow-gauge yard locomotives for hauling material to and from the open-hearth furnaces.

The Pacific Coast Steel Company also owns works at Portland, Ore., for making bar and band iron, and has a 60 x 11-ft. blast furnace at Irondale, which has not been in operation for some time.

Judge E. M. Wilson is president and treasurer of the company. D. P. Doak and William Pigott



The Three Stands of the 22-In. Structural Mill at the Seattle Works Are Rope Driven from a 1200-Hp. Motor Shown at Extreme Right

billets are included in the equipment. The mill building is of structural steel and reinforced concrete also, and is equipped with a 7 $\frac{1}{2}$ -ton Shaw 80-ft. span electric crane. Parallel, with a 70-ft. span 7 $\frac{1}{2}$ -ton Shaw crane with a lifting magnet, is the mill billet yard; this second crane puts ingots into the 22-in. mill furnace and handles the billets coming from the mill.

The 16-in. mill is a three-stand three-high bar mill operated from a 700-hp. Corliss engine and equipped with two heating furnaces, each with a 150-hp. Cooke waste heat boiler utilized to supply steam for operating the engine.

The 9-in. guide mill is composed of three stands of three-high rolls and two stands of two-high rolls, belt-driven from a 300-hp. Corliss engine operating at 100 r.p.m., but driving the mill at 240 to 260 r.p.m. The heating furnaces for this mill have a 250-hp. Cooke waste heat boiler.

The 16-in. muck bar mill comprises five stands of three-high rolls and is driven at 180 r.p.m. by an 800-hp. alternating-current motor from 16 strands of  $\frac{7}{8}$ -in. rope. One continuous heating furnace serves this mill, having a 150-hp. waste-heat boiler to operate steam pumps and auxiliary machinery.

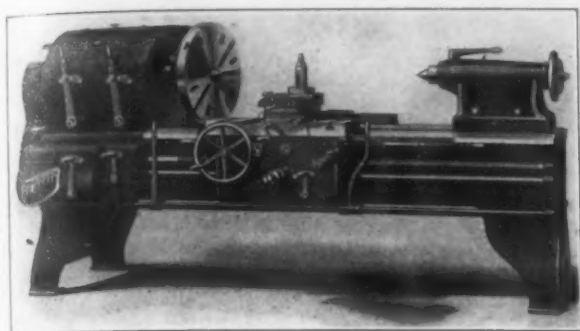
are vice-presidents. Mr. Pigott is in charge of the Seattle plant, with T. S. Clingan general manager at Seattle, and George W. Foraker general superintendent at Seattle. W. S. Burt is secretary of the company and located at Seattle. E. S. Houdlette is auditor and assistant secretary at the headquarters, in the Rialto Building, San Francisco, and some of the other officials are J. C. Wallace, Jr, purchasing agent; John B. Leonard, district general sales manager; D. E. McLaughlin, southern general sales manager at Los Angeles, and S. S. Lawrence, formerly with the Pennsylvania Steel Company, foreign general sales manager.

The Laursen Automatic Pump Company, Menomonie, Wis., manufacturing pumping engines for mining, irrigation, drainage, etc., has reorganized, following the resignation of L. A. Laursen, president and chief engineer. The new officers are: President, C. A. Straubel, Green Bay, Wis.; vice-president, J. R. Myers, Green Bay; secretary, W. J. Eberwein, Menomonie, Wis.; treasurer, A. J. Edminister, Holcomb, Wis. The company recently moved from leased quarters at Chippewa Falls, Wis., to a plant purchased at Menomonie. The new quarters were inadequate, and a branch factory was established at Green Bay. Both plants are now running at full capacity.



## Heavy-Duty Single-Pulley Drive Lathes

A new line of heavy-duty, single-pulley drive, all geared head, quick change gear, engine lathes is being brought out by the Cleveland Machinery & Supply Company, Cleveland. The machine that is illustrated is the 20-in. size, but it will also be built in 18, 22, 24, 26, 28, 30, 32 and 34 in. swings, in



A 20-In. Heavy-Duty Single-Pulley Drive Lathe for Automobile and Forge Shops

any length of bed required. This lathe is of heavy construction, being designed for all classes of heavy work and is claimed to be particularly well adapted for automobile and forge shops. The bed is unusually wide and heavy and is of the box-section type. It has a large compensating V in front and a flat way in the rear.

The headstock is of improved geared construction, having a single-pulley drive with nine mechanical speed changes operated by two levers. All gears are of steel. The single pulley is equipped with a powerful friction clutch operated from the front of the machine either at the headstock or apron as may be desired. The bearings, including those for the spindle, are bronze bushed and the spindle is provided with a ball thrust bearing with lock nut adjusted for wear.

The carriage has an exceptionally long bearing on the shears, is equipped with a wide compound rest bridge and is gibbed both in the front and back. It also has a solid bearing on the bed throughout its entire length. The cross-slide and compound rest are provided with taper gibbs for taking up the wear. Both the front and back wings of the carriage are provided with felt wipers to protect the V's. The apron is of the heavy box type and has steel gears throughout. The bearings are bronze bushed. The bearings in the back wall of the apron are all oiled from one oil reservoir which is reached from the top of the carriage.

Only one friction is used for operating both the longitudinal and the power cross feeds. Automatic stops and reverse for the feeds are furnished. The apron is equipped with a safety device which prevents the engaging of the half nut without first throwing the feed lever in the central position. The operator is, therefore, unable to engage both the screw and rod feeds at the same time. The quick change gear box is of the cone type construction and provides for a wide feed and thread range. It is equipped with steel gears and the bearings are bronze bushed. The driving mechanism for the lead screw and feed rod is arranged so that both cannot be revolved at the same time, thereby doing away with any unnecessary wear on the lead screw when the machine is used only for turning.

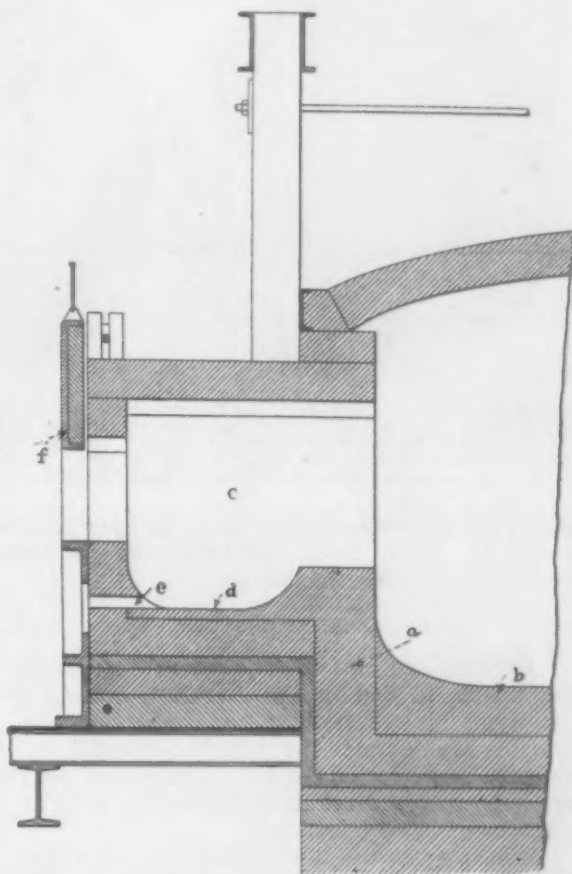
The lathe in any of its sizes will be furnished equipped with any attachments required, such as taper attachment, four tool turret tool post, heavy hexagon carriage turret and power feed bed

turret. It will also be furnished for motor drive with either direct or alternating current. The motor drive will be provided either with direct gear or silent chain drive as desired. Reverse to the spindle will be supplied either for belt drive or motor drive.

## New Device to Premelt Ferroalloys

What is claimed to be an improvement in open-hearth furnaces is covered by a patent (U. S. 1,188,867, June 27, 1916) granted to Bradley P. Wheeler of Duluth, Minn., with one-half assigned to Thomas S. Blair, Jr., of Chicago. It comprises a melting compartment, built as an extension to the back wall of the furnace, in which ferromanganese and other final additions are melted by the heat of the furnace.

The illustration shows the design in which *a* is the back wall of a furnace of which *b* is the hearth, with cross-section from front to back. Against the back wall and preferably adjacent to the tap hole is the chamber *c* open to the interior of the furnace. It has a melting hearth, *d*, and a tap hole, *e*, and is closed by a door, *f*. The finals, such as ferromanganese, ferrosilicon, spiegeleisen, ferrochrome, etc., are



Cross-Section, Front to Back, of an Open-Hearth Furnace, Showing the Additional Chamber for Premelting Ferroalloys

charged through this door and are melted by the heat of the furnace. They are tapped and added to the heat as needed, doing away with any special melting or delay caused by their preparation.

The Sullivan Machinery Company, 122 South Michigan Avenue, Chicago, and Salisbury House, London, England, has established an agency in Holland with Petrie & Co., Heerengracht, 141-145 Amsterdam, as its special representatives. Petrie & Co. will sell the Sullivan air compressors, rock drills, hammer drills, diamond core drills, quarrying and coal mining machinery in the Netherlands. This new arrangement replaces the Sullivan Machinery Company agency previously at the Hague.

# Detecting Alumina Inclusions in Steel

An Investigation as to Their Occurrence and Appearance—Distinguishable Under the Microscope from Other Impurities

—BY ALBERT SAUVEUR\*

**I**NCLUSIONS in steel, as commonly described, comprise silicates, chiefly of manganese and of iron (frequently called slag), and manganese sulphide (often associated with iron sulphide). The use of titanium as a deoxidizer may introduce some titanium nitride inclusions, while the use of aluminum for the same purpose may result in the formation of alumina inclusions through the oxidation of some of the aluminum.

The present investigation was undertaken for the purpose of ascertaining whether the occurrence of alumina inclusions in steel could be detected

The too plentiful use of Al in steel may have been condemned, partly at least, because it forms oxides or silicates in the metal, which, being insoluble and infusible, exist in the solid steel as very harmful sonims. Of course, to form the oxide there must still be some oxide of iron or manganese in the steel. If the metal were free from O perhaps the weakening effect of Al, when added in greater quantity than a few hundredths of 1 per cent, would not occur. So a part of the Al added in the ladle would form sonims which might be fluxed and floated out, while that added in the molds, if the steel were free from O, would not be oxidized, but would all be left to exercise its full effect in preventing the formation of gas bubbles and the resulting blowholes in the steel.

GEORGE F. COMSTOCK ON ALUMINA IN STEEL

In an article entitled "A Study of Alumina in Steel," published in *Metallurgical and Chemical Engineering* for Dec. 1, 1915, George F. Comstock, metallurgist, Titanium Alloy Mfg. Company, Niagara Falls, N. Y., describes the occurrence and appearance of alumina inclusions in steel as follows:

These inclusions are in the form of small rounded spots, arranged close together in one elongated streak. They are of a very dark bluish-gray color, when examined with the white light of

an electric arc, appearing black unless highly magnified, and it is practically impossible to polish them without forming little pits around each inclusion. If the polishing is done very carefully, these pits may be kept very small; but with certain methods of polishing, the pits are made so large that the original inclusions cannot be seen at all.

... If the specimen is not rotated constantly during the final polishing, the pits take the form of short scratches, and each inclusion will have a little tail, like a comet. It will be noticed in Fig. 1 that although this shows a longitudinal view of a bar, the individual inclusions have not been elongated by the forging at all, but merely the group as a whole has been drawn out into a streak.

The difference between inclusions of alumina and ordinary slag or silicates in steel may then be summarized as follows:

(1) Silicate inclusions will generally take a fairly smooth polish in a section prepared for microscopic examination, while alumina is very hard to polish without pitting. (2) Silicate inclusions are always elongated in the direction of rolling or forging, while alumina particles are not (the groups of particles are, of course, elongated but not the particles themselves). (3) Silicate inclusions are often found of quite large size (as well as very small), while particles of alumina are always small, and do not seem to coalesce into large bodies even when closely grouped together. These characteristics of alumina inclusions agree with what is known of the properties of alumina. Its great hardness and brittleness would account for the pitting effect; its infusibility would account for the small size of the particles and the tendency not to coalesce; and both of these properties together would account for

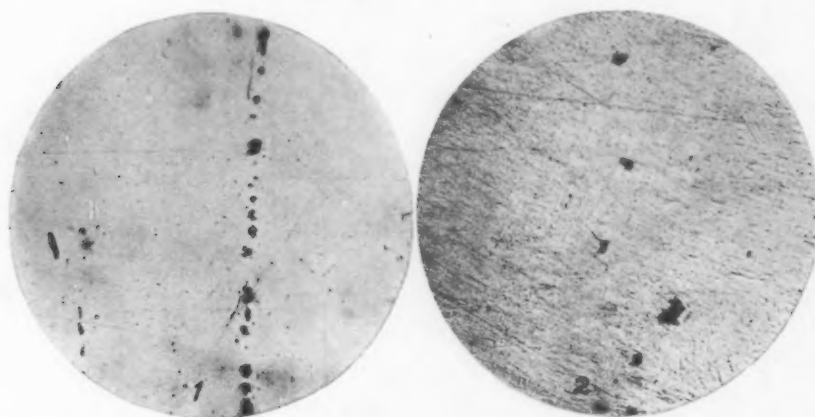


Fig. 1 is a Photomicrograph of the Longitudinal Section of a Bar, Forged from a Steel Ingot to Which 0.144 Per Cent Aluminum Was Added. Fig. 2 is a Photomicrograph of the Polished Unetched Surface of the Longitudinal Section of a Forged Bar of Thermit Iron Treated with Alumina. Both have been reduced about one-fourth from an original magnification of 300 diameters

under the microscope and of studying the characteristics by which these inclusions can be distinguished from other inclusions.

## PAST LITERATURE

Barring one or two unimportant exceptions, I am unable to find in the literature dealing with inclusions any reference to the occurrence of alumina antedating the article presently to be referred to. Previous to this, alumina had not generally been considered as a distinct, or, at least, as a distinguishable inclusion.

Referring to the use of aluminum as a deoxidizer, however, and to the resulting formation of alumina, Walter Rosenheim, in his book, "An Introduction to the Study of Physical Metallurgy," writes:

A more powerful deoxidizing agent than manganese is furnished by aluminum, but this differs from manganese in two vitally important respects. In the first place, the oxidation product of aluminum is a particularly refractory substance—alumina—which has a strong tendency to remain in the molten metal in suspension as fine particles.

In a paper before the American Institute of Mining Engineers, entitled "The Solid Non-Metallic Impurities in Steel," Henry D. Hibbard writes:

If other elements have been added, such as Al, W, Cr, Ti or Va, their oxides and silicates may be present.

\*From a report by the author, who is professor of metallurgy in Harvard University, Cambridge, Mass.



the particles not being elongated by forging or rolling of the steel in which they were embedded. . . .

All samples in which more than the merest trace of alumina was found by analysis were seen to contain the typical inclusions as described above, and those in which alumina was not found by analysis, did not contain these inclusions. Furthermore, those in which more alumina was found by analysis contained more of these inclusions than those in which only a very little was found. These facts have been considered as a good confirmation of the theory that the typical small inclusions, as described above, found in so many commercial steels, are chiefly, if not wholly, alumina.

#### THE PRESENT INVESTIGATION

As a preliminary step I took photomicrographs at a magnification of 300 diameters of five samples that Mr. Comstock used in his work, and a comparison of these photomicrographs with those taken by him showed that both sets were very similar and that they confirmed his description of the appearance of the inclusions.

In Fig. 1 is shown, under a magnification of 300 diameters the appearance of the longitudinal section of a bar forged from a steel ingot to which 0.144 per cent aluminum had been added during the teeming from the ladle to the molds. The steel was made at the Watertown Arsenal, Watertown, Mass., in a Tropenas converter. Both ferromanganese and ferrosilicon were used in recarburizing and deoxidizing. The inclusions shown in the photomicrograph present the characteristics described by Mr. Comstock as pertaining to alumina inclusions, namely, small dimensions of the individual particles, dark coloration, string formation in the direction of the forging but non-elongation of the particles themselves.

Attempts were made as follows to produce molten iron under such conditions as to preclude the occurrence in the solidified metal of any inclusions but alumina:

1. Thermit iron produced with an excess of aluminum.
2. Ingot iron melted with aluminum.
3. Ingot iron melted with alumina.

The results obtained are briefly described as follows:

#### THERMIT IRON

A small mass of thermit iron was produced in the usual way in a graphite crucible with the addition of a small amount of finely powdered aluminum to the thermit mixture as commercially supplied. The small ingot was forged into a bar about  $\frac{1}{4} \times \frac{1}{4}$  in. in cross section.

It is believed that the thermit mixture practically consists of pure iron oxide and pure aluminum, and that any inclusions present must of necessity be alumina resulting from the oxidation of some aluminum.

A longitudinal section of the forged bar was prepared for microscopical examination and the polished but unetched surface photographed under a magnification of 300 diameters (Fig. 2). It will be seen to contain many small, dark and roughly rounded particles scattered through the iron. It should also be noted that there is no indication

whatever of these inclusions having been elongated by the forging. Although they do not occur in clusters or in strings, they present the chief features described by Mr. Comstock as characteristic of alumina inclusions, the most significant of which is the absence of elongation in the direction of the forging.

#### INGOT IRON MELTED WITH ALUMINUM AND ALUMINA

A small amount of ingot iron was melted in an alundum crucible with the addition of aluminum. The expectation was that enough oxygen would be present to cause the oxidation of some aluminum and, therefore, the occurrence of alumina inclusions to the exclusion of all other inclusions. The resulting mass was forged into a bar measuring about  $\frac{1}{4} \times \frac{1}{4}$  in. in cross section. A longitudinal section of the bar was polished and photographed under a magnification of 300 diameters. The presence of a number of small dark particles was clearly revealed (Fig. 3). They exhibit the characteristics previously described as pertaining to alumina inclu-

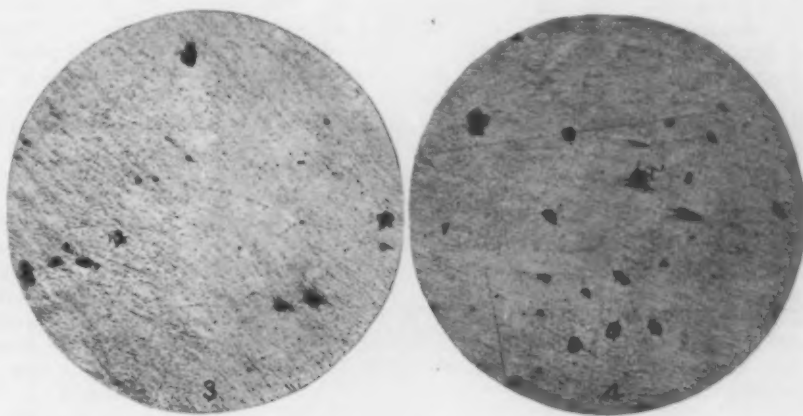


Fig. 3 is a Photomicrograph of the Longitudinal Section of a Bar Forged from Ingot Iron Treated with Aluminum. Fig. 4 is the Same from Ingot Iron Treated with Alumina. Both have been reduced about one-fourth from an original magnification of 300 diameters

sions, being small in size, dark in color, and non-elongated in the direction of the forging.

Some ingot iron was melted in an alundum crucible with finely powdered alumina. It was assumed that while most of the alumina might float to the top of the molten bath, some of the finest particles at least would be retained in the solidified metal as alumina inclusions. The small ingot was forged into a bar  $\frac{1}{4} \times \frac{1}{4}$  in. in cross section, and the appearance of a longitudinal section polished and magnified 300 diameters is shown in Fig. 4. Here again we note the occurrence of small dark inclusions scattered through the mass and devoid of any tendency to elongate in the direction of the forging.

#### CONCLUSIONS

From the results published by Mr. Comstock and confirmed by my examination of some of his samples, and from the results obtained in my own experiments as reported in the foregoing pages, it seems justifiable to conclude that alumina inclusions may be distinguished under the microscope from the other inclusions generally occurring in steel, being characterized by their small size, their dark coloration and more especially by a complete absence of elongation in the direction of the rolling or forging.

About 600,000 automobiles were built in the United States in the year ended June 30, 1915, as compared with 445,000 on the preceding year. The output for the year ended June 30, 1916, is estimated at 900,000.



## ACID RESISTING ALLOYS\*

### Composition and Properties of Duriron, Tantiron and Others—Substitutes for Stoneware

BY W. C. CARNELL

For many years various metals and alloys have been offered for which more or less acid resisting properties were claimed. They had their uses but as complete acid resisting materials they were not successful. With the advent of fused silica a decided advance was made, and it successfully replaced platinum in a number of processes.

#### FUSED SILICA, FERALUN AND FERROCHROME

In 1911 a basin of fused silica was tried out at the factory with which the writer was connected; so successful were the results that a 10-ton cascade concentrating plant for sulphuric acid was erected to replace a platinum outfit. The results were all that could be desired. The acid made was even better than that made in platinum. Fused silica is brittle and costly and must be handled with as much care as glass.

In 1913 a material under the trade name of Feralun was tried out. This was a mixture of cast iron and an abrasive, the abrasive being an alloy of aluminum and silicon. The surface of the iron was covered with the abrasive. The abrasive was acid resisting, but the acid soon destroyed the iron, leaving a porous mass. We, however, found Feralun useful for nipples on acid tank cars.

Fused silicon has acid resisting properties that are all that could be desired for sulphuric acid, but it is more brittle than fused silica, and its use has not been very extensive. Ferrochrome is a very promising product. Glacial acetic acid does not attack it; 56 and 28 per cent acetic acid attacks it slightly. Strong and weak nitric and sulphuric acids have practically no effect on the alloy. Hydrochloric acid attacks it readily. The experiments were carried out in a bowl 18 in. in diameter and 6 in. deep.

#### SILICON-IRON ALLOYS

The materials thus far mentioned are valuable for specific purposes. The real dawn of acid resisting alloy came with the use of silicon-iron alloys. The beginning of the use of these alloys was about six years ago. The first advertisement the writer observed of this alloy was in the *Journal of the Society of Chemical Industry*, Jan. 15, 1912. This was a silicon-iron alloy, Tantiron, introduced by the Lennox Foundry Company, Ltd., of London, England.

In May, 1912, after a year of experimenting, the first silicon-iron alloy in the United States was put on the market under the name of Duriron, by the Duriron Casting Company of Dayton, Ohio. Ironac is another trade name for a silicon-iron alloy made by the Houghton Company, Ltd., of London, England. While these are all alloys of iron and silicon, their composition is not the same.

Silicon-iron alloys, as put out under the above names, are very resisting to all strengths of sulphuric acid, and apparatus made of this alloy is used in all forms of concentrating vessels and cooling devices for the concentration of this acid. By the use of the so-called cascade basins, set in a proper furnace, full strength oil of vitriol is made from 50 deg. acid. If all the fittings and coolers are made from this alloy the resulting oil of vitriol is practically free of iron after the plant has been in operation a few weeks. Where brimstone acid is used the resulting oil of vitriol should not contain over 0.0002 per cent iron. For sulphuric acid concentration, the alloy is durable and the breakage is very small. A plant properly handled will run for months without a shut down. The success of the modern tower system for concentrating sulphuric acid has been due largely to the use of pipes and fittings made of this alloy.

\*From a paper read before the eighth semi-annual meeting of the American Institute of Chemical Engineers at Cleveland, Ohio, June 16. Mr. Carnell is with Harrison Brothers Company, Philadelphia, Pa.

#### AS A SUBSTITUTE FOR STONEWARE

Silicon-iron alloy castings have extensively replaced stoneware parts for the manufacture of nitric acid. Early in 1915 the demand for nitric acid increased to enormous proportions; extensions to old nitric acid plants and the erection of new and larger plants was immediately demanded. The capacities of the stoneware factories of the country were soon taxed to their limit. Deliveries could not be made under six months, if at all; had the production of nitric acid been dependent upon stoneware as it was a few years ago, the production of nitric acid would have been greatly curtailed and the story of the great war would probably be different.

The silicon-iron alloy is resistant to nitric acid of various strengths. It can be cast into all the various forms required for nitric acid apparatus. Castings can be made as readily and as quickly as can those made of cast iron. Here was the ideal substitute for stoneware. Necessity compelled its use and to-day it has largely superseded stoneware for nitric acid production.

#### DURIRON IN A NITRIC ACID PLANT

A large nitric acid plant equipped entirely with this alloy in the form of Duriron was in service for eight months; the alloy showed no indications of corrosion or deterioration. There was practically no breakage. Fire destroyed the building housing of the plant and most of the supports for the apparatus. It did not harm the castings, though they were exposed to intense heat, and 80 per cent were recovered, put into service and are in use at the present time. Ninety per cent nitric acid, made in a plant equipped with Duriron castings showed an average iron content of 0.0014 per cent iron, while 36 deg. nitric acid (52.30 per cent) showed 0.0042 per cent iron.

The silicon-iron alloy was developed to resist acid. It not only resists acid, but it is resistant to corrosion and to rust. Ground surfaces, representing the true alloy, are practically immune from rust. The rough casting may show some rust on exposure, but this is due to impurities in the surface, caused by contact of the alloy with the molding sand; this is a surface rust only and will not penetrate. The alloy is also heat resisting, when made of suitable design. The walls must not be too thick for very high temperatures. Castings do not distort on heating, but hold their form up to the melting point. The composition properties of Duriron are as follows:

Silicon .....	14.00 to 14.50 per cent
Manganese .....	0.25 to 0.35 per cent
Total carbon .....	0.20 to 0.60 per cent
Phosphorus .....	0.16 to 0.20 per cent
Sulphur .....	Under 0.05 per cent
Melting point .....	2500 to 2550 deg. Fahr.
Specific gravity .....	7.00
Compression strength .....	70,000 lb. per sq. in.
Tensile strength .....	25 per cent less than cast iron

A bar of Duriron was compared with a bar of equal size of the best grade of chemical pottery, under equal conditions, the earthenware test bar broke so quickly that the testing machine gage did not record any pressure. The Duriron bar broke under a load of 1000 lb. By using a suspended vessel on an earthenware bar and gradually loading it with small pieces of metal and sand, a breaking test of 100 lb. was obtained for the earthenware bar.

#### TANTIRON AND ITS PROPERTIES

Tantiron was first produced by Robert W. Lennox of the Lennox Foundry Company of London, England, about 1908. In 1913 the rights for the use of this alloy in the United States, Canada and Mexico were acquired by the Bethlehem Foundry & Machine Company of South Bethlehem, Pa. An approximate analysis of the properties of Tantiron is as follows:

Silicon .....	14.00 to 15.00 per cent
Sulphur .....	0.05 to 0.15 per cent
Phosphorus .....	0.05 to 0.10 per cent
Manganese .....	2.00 to 2.50 per cent
Carbon (graphite) .....	0.75 to 1.25 per cent
Melting point about .....	2550 deg. Fahr.
Specific gravity .....	6.8
Tensile strength .....	6 to 7 tons per sq. in.

In general silicon-iron alloys cannot be cast in rectangular shapes or flat surfaces. The chemical engineer should collaborate with the foundryman in order to design shapes which can be produced in the foundry and still serve the purpose of the operating conditions required.

The alloy is not suitable for apparatus in which high internal pressures are to be used unless it is protected by a protecting jacket. Forty to fifty pounds is given as the maximum pressure for an autoclave made of Tantiron.

#### CONCLUSIONS

While there is still opportunity for improvement and while there is much more to be desired in an acid resisting material out of which to construct apparatus for the acid industry, yet the silicon-iron alloy or silicide of iron, as it has been called, has proved a boon to the acid industry, and without which many things could not have been accomplished.

It is more efficient than stoneware. At best, chemical stoneware, if made properly, should take 10 to 12 weeks for its production. Castings of this alloy can be made and delivered in the same time it takes to make castings out of cast iron.

The limitation to castings of this alloy are shop and foundry limitations only. One company has a foundry with a furnace capacity of 72 tons per day. To-day thousands of tons of castings made of this alloy are in use. It is finding its way into all branches of the chemical industry. Since its introduction new chemical processes have been started which were impossible before because of lack of suitable apparatus.

Silicon-iron alloys are being improved rapidly and the time does not seem far distant when all sorts of vessels will be made of this or a similar alloy that will give to the chemical industry the ideal non-corrosive material that may be fabricated into all the shapes peculiar to the needs of the industry.

#### Two-Speed Alternating-Current Elevator Motor

A car speed of 400 ft. per minute is made possible by the use of a new alternating-current motor for elevator service that has been developed by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Formerly the speed limit for this type of equipment was 200 to 250 ft., it is explained, due to the fact that a single-speed motor which was stopped by a mechanical brake had to be used. The special feature of the new two-speed motor is the employment of two separate windings in both the stator and the rotor. For starting a 24-pole connection is used which gives a motor speed of 250 r.p.m. As soon as this is reached the connections are changed automatically to give eight poles and the motor then comes up to a speed of approximately 850 r.p.m.

In slowing down the 24-pole connection is again brought into service and advantage is taken of the fact that an induction motor driven above synchronism acts as a generator to produce an electrical braking action that reduces the speed. The car is finally brought to rest by an electrically-operated mechanical brake which is applied after the motor is disconnected from the supply line. The controller used consists of a number of magnetically-operated switches and relays which cut the resistance out of the circuit automatically and shift the line connections from one winding to the other at the proper time.

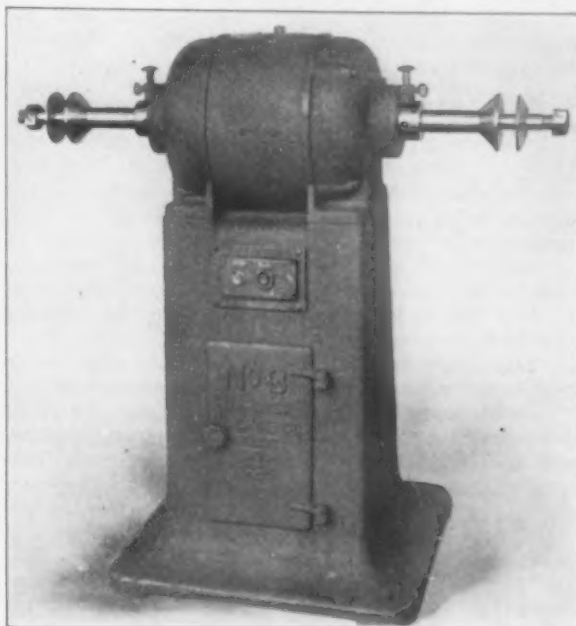
The D. Wilcox Company, Mechanicsburg, Pa., manufacturer of drop forgings, etc., at its recent annual meeting elected officers as follows: President and general manager, Frank E. Wilcox; vice-president, Samuel T. Houck; secretary and treasurer, Mervin E. Anderson.

Manufacturers of Chattanooga, in an effort to cope with the labor shortage, have organized an employment bureau. Offices have been opened in the Manufacturers' Building, 815 Broad Street, with A. D. Kirby in charge.

#### Push-Button Controlled Polishing Lathe

A new design of motor-driven polishing and buffing lathe has been added to the line built by the Gardner Machine Company, Beloit, Wis. This new machine, which is built in several sizes, is provided with push-button control and a fan is mounted on the armature shaft to supply forced ventilation for the driving motor, which is of the inclosed type. Special end frames containing the ball bearings for the armature are used for the motors. Either direct or alternating current motors are used, and it is possible to provide adjustable speed for the wheels when desired.

The push-button control panel is conveniently located on the front of the machine pedestal. The button at the right is used for starting and is sunk below



Motor-Driven Polishing and Buffing Lathe Equipped with a Push Button Control Panel Recessed to Prevent Accidental Starting and a Fan Mounted on the Motor Armature to Provide Forced Ventilation for the Inclosed Driving Motor

the face of the plate with a view to preventing unintentional starting. A further precaution against accidental closing of the circuit is supplied by a simple locking device provided for the stopping button at the left of the panel. Either alternating or direct current motors are used and it is possible to vary the speed of the machine spindle. When an adjustable-speed drive is desired direct-current motors having a speed range or operating at a constant rate are used, a lever within the base being moved to the desired rate. Pressing the starting button then causes the motor to come up to the speed at which the adjusting device in the base is set. With the alternating-current motor, it is not possible to obtain as fine an adjustment, as only certain speeds are available.

The motor used for driving the machine is fully inclosed, an arrangement which is relied upon to make them both dust and dirt proof. A fan attached to the motor shaft inside of the cover draws air up from the base on the right, forces it through the motor and down into the pedestal at the left. In this way it is emphasized a thorough circulation of air is obtained under normal operating conditions and the motor is prevented from overheating.

When it is desired to change the wheels a special locking device is employed. This consists of a button head pin acting over a coil spring. One of these devices is provided for each spindle, and in use they are pushed down into one of the four holes which are placed at equal distances around the spindle collar. It is thus possible to lock either one or both spindles as may be desired.

The Minneapolis Crucible Steel Company, Minneapolis, has purchased a small Snyder electric furnace.



# The Oxygen Content of Iron and Steel\*

Its Effect on Their Properties—  
The Johnson Irons Discussed—The  
Presence of Oxygen in Ingot Iron

—BY J. ALLEN PICKARD—

THE following report is a continuation of previous work on the same subject carried out by the author, and also jointly with F. M. Potter, and published in *Carnegie Scholarship Memoirs*, 1912, page 52, and *Journal of the Iron and Steel Institute*, 1914, No. II, page 181. The results already published refer almost entirely to open-hearth steel, and the present paper deals with other varieties of steel and with cast iron and wrought iron.

## OXYGEN IN BESSEMER STEEL

The specimens examined were supplied through the courtesy of Samuel Fox & Co., Ltd., of Sheffield, and C. H. Ridsdale of Middlesbrough. The specimens were chosen as being representative of their class, and good, average quality material, so that the results may be taken as indicative of the amount of oxygen normally occurring in this class of steel. For convenience of reference the samples are arranged in the various tables in ascending carbon order.

It is possible to notice in the Bessemer steels some correspondence between silicon and oxygen content, but the relation is too ill marked and irregular for much importance to be attached thereto. The very striking exception (No. 11) which has 0.015 oxygen with 0.255

Oxygen in Acid Bessemer Steel						
No.	Carbon, Per Cent	Man- ganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phos- phorus, Per Cent	Oxygen, Per Cent
1	0.42	0.61	0.066	0.049	0.057	0.014
2	0.45	0.85	0.080	0.056	0.048	0.017
3	0.49	0.90	0.098	0.048	0.054	0.014
4	0.51	0.83	0.048	0.046	0.056	0.018
5	0.53	1.07	0.060	0.045	0.050	0.007
6	0.75	1.01	0.082	0.049	0.049	0.014
7	0.80	0.85	0.090	0.046	0.050	0.006
Mean.....						0.013
Oxygen in Basic Bessemer Steel						
8	0.01	0.175	nil	0.055	0.05	0.077
9	0.09	0.475	nil	0.055	0.05	0.031
10	0.475	1.0	0.085	0.06	0.05	0.010
11	0.49	1.0	0.255	0.06	0.07	0.015
Mean.....						0.019 <sup>1</sup>

<sup>1</sup>Omitting No. 8, which was not deoxidized.

silicon strengthens a suggestion expressed in a former paper that oxygen content is not dependent on the actual percentages of other elements present, but rather on details of procedure in manufacture. Thus it may well be that with a firm regularly making steel of one general composition and observing the same procedure from day to day, the oxygen may be found to vary inversely with the silicon content; while with another maker, steel of approximately the same analysis may contain quite a different amount of oxygen. If this opinion were ultimately substantiated, then the oxygen content of the finished metal would appear to be one trustworthy criterion of the excellence of the works practice.

## CRUCIBLE STEEL

The samples examined were supplied by Samuel Fox & Co. and Sir Robert Hadfield. Their analyses and oxygen contents are given in one of the tables.

## WROUGHT IRON

Swedish wrought iron, purchased wrought iron of unknown make, and specimens of best Yorkshire iron were examined. The Swedish iron was in the form of a thin flat bar, and drillings were taken along the

\*From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May, 1916.

whole length. The purchased iron in the form of plates was drilled at various points in the surface. The best Yorkshire iron was supplied as a round bar and the samples for analysis were taken by mounting in the lathe and turning off the end face completely from the circumference to the center and thoroughly mixing the turnings. The Yorkshire iron is lowest in oxygen, the Swedish slightly higher, and the purchased samples very much higher.

An interesting, and at first sight rather puzzling, matter is the difference between the loss in weight of the samples due to abstraction of the oxygen and the total loss in weight, which is especially noticeable in the case of the Yorkshire iron. When a determination of oxygen is made the difference in the weight of the sample before and after treatment is always determined, as a precaution which might serve to detect errors. For instance, if the total loss in weight of the sample were less than the percentage of oxygen found it would be evident that the latter must have been erroneous. In the case of steels it is found in practically every case that the loss in weight, as would be expected, is slightly greater than the percentage of oxygen found, but not very much so. This might readily be explained by loss of moisture from the surface of the drillings in the first operation of the method of analysis, by loss of carbon, of sulphur, and perhaps nitrogen.

It had been anticipated that in the case of wrought iron, in which there was no reason to expect that total loss in weight from these causes would be greater than in steel, the oxygen percentage would check fairly well with the loss, but this is not the case. The difference is explainable, however, even with the Yorkshire iron, on the assumption that oxygen is extracted in combination with carbon; and determinations of carbon before and after the oxygen determination were made, with the result that about 80 per cent of the difference between oxygen percentage and total loss was found to be due to carbon. In both cases the difference between oxygen and loss is nearly the same for samples of the same material, although the oxygen percentage is not so:

	Oxygen, Per Cent	Loss, Per Cent	Differ- ence, Per Cent	Carbon, Before, Per Cent	Carbon, After, Per Cent
Wrought iron (1)...	0.510	0.565	0.055	....	....
Wrought iron (2)...	0.603	0.657	0.054	....	....
Yorkshire iron (1)...	0.161	0.268	0.107	....	....
Yorkshire iron (2)...	0.110	0.208	0.098	0.122	0.042

This result is particularly interesting, since it suggests that oxygen is first eliminated from iron (and presumably also from steel) chiefly in the form of carbon monoxide produced by the initial action of carbon on iron oxide, and that the water formed and weighed only results from the decomposition of this intermediate product, and not directly from the oxide itself. The possibility that all oxygen may be originally present as carbon monoxide is excluded by microscopic evidence adduced by Law, by Matwieff and Steinberg. Law finds that oxide specks were visible under the microscope if the specimen had received a high polish and a magnification of 1000 diameters. When the polished specimen was heated in hydrogen, pits resulted which occupied a greater area than the original spots. The results of Matwieff are corroborative. Steinberg finds that open-hearth steel before deoxidation shows characteristic streaks and cracks in the ferrite crystals.

These results show definitely that some oxygen is present as oxides of iron and manganese. Simple decarburization owing to the heating in hydrogen, irre-



spective of oxygen in the metal, is excluded by the fact that decarburization does not take place to anything like the same degree with steel, which contains more carbon but less oxygen; and also because the decarburization does not proceed beyond this limit if heating be longer continued.

In passing it may be remarked that this behavior furnishes corroborative evidence that the objection to the author's method of estimation, based on the assumption that carbon monoxide will not be extracted from steel except in a high vacuum, is quite unfounded. Considerable support is also given to the view, which has gradually been gaining weight, that carbon

to a moderate extent in liquid iron, and permit of an approximate estimate of the extent of this solubility being made. They cannot, however, be taken to show that the oxide remains dissolved when the steel solidifies, although the microscopical evidence already cited permits the belief that a considerable part also remains in solid solution.

OXYGEN IN CAST IRON

Some attention having been drawn by J. E. Johnson, Jr., claiming the most remarkably beneficial results from the presence of oxygen in cast iron, some specimens of gray and of white irons were examined.

When the exceedingly complex nature of iron is borne in mind, and the very considerable percentage of carbon, silicon, and manganese often present, it seems *prima facie* extremely unlikely that oxygen can coexist therein, and it was consequently with considerable surprise that unmistakable indications of its presence in white iron were found. Two specimens of chilled iron were kindly supplied by W. M. Frank Schneider, of the British Griffin Chilled Iron & Steel Company. Specimen No. 1 was stated to be of excellent quality for the special purposes of the makers, and No. 2 not quite so good. The analyses of the two samples were as follows:

	No. 1, Per Cent	No. 2, Per Cent
Combined carbon.....	2.656	0.797
Graphite .....	0.550	2.450
Silicon .....	0.615	0.699
Sulphur .....	0.067	0.126
Phosphorus .....	0.198	0.207
Manganese .....	0.987	0.532
Oxygen .....	0.017	0.021

This material being particularly hard and tough, and consequently difficult to disintegrate, it may not be out of place to state here that the samples for analysis were obtained by drilling with a specially tempered flat drill. The outside of the samples was carefully cleaned on an emery wheel and the outer skin drilled well through before any material was collected for analysis. The samples never became more than warm to the touch during drilling, and closely agreeing results for oxygen were obtained on 30-gram samples.

From the above figures it is impossible to doubt that small amounts of oxygen occur in white iron. What the state of combination may be, and what effect, if any, its presence may have on the quality of the

Oxygen in Acid Open-Hearth Steel						
No.	Carbon, Per Cent	Man- ganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phos- phorus, Per Cent	Oxygen, Per Cent
12	0.67	0.73	0.95	0.035	0.027	0.004
13	0.79	0.65	0.21	0.030	0.050	0.021
14	0.93	0.68	0.035	0.031	0.027	0.007
15	1.08	0.62	0.024	0.033	0.022	0.014
16	1.18	0.65	0.056	0.027	0.025	0.006
17	1.33	0.42	0.140	0.030	0.024	0.004
18	1.55	0.49	0.100	0.027	0.026	0.011
	Mean.....					0.010

Oxygen in Basic Open-Hearth Steel						
No.	Carbon, Per Cent	Man- ganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phos- phorus, Per Cent	Oxygen, Per Cent
19	0.10	0.05	0.020	0.033	0.018	0.037
20	0.14	0.35	0.020	0.033	0.018	0.011
21	0.20	0.04	0.04	0.026	0.026	0.030
22	0.23	0.70	0.1-15	0.060	0.026	0.014
23	0.26	0.49	0.120	0.030	0.031	0.005
24	0.30	0.05	0.05	0.051	0.020	0.029
25	0.32	0.62	0.1-15	0.057	0.025	0.041
26	0.33	0.62	0.1-15	0.027	0.020	0.023
27	0.35	0.56	0.182	0.027	0.020	0.007
28	0.41	0.52	0.026	0.032	0.023	0.017
29	0.44	0.04	0.085	0.022	0.024	0.027
30	0.54	0.69	0.1-15	0.055	0.011	0.003
31	0.55	0.97	0.05	0.053	0.021	0.017
32	0.55	0.05	0.100	0.033	0.052	0.020
33	0.61	0.74	0.025	0.025	0.022	0.041
34	0.66	0.65	0.096	0.030	0.028	0.006
35	0.75	0.38	0.036	0.016	0.025	0.026
36	0.82	0.67	0.036	0.016	0.025	0.006
37	1.00	0.67	0.036	0.016	0.025	0.007
	Mean.....					0.019

monoxide, and even dioxide, extracted from steel by heating in *vacuo*, do not exist as such in the steel, but are formed as a result of the action of carbon on oxides present. There is clear evidence that oxygen, originally present as a metallic oxide, parts company with the steel in combination with carbon even when the metal is heated in an atmosphere of hydrogen.

OXYGEN IN INGOT IRON

A sample of this material supplied from America, guaranteed 99.86 per cent iron, was found by the author to contain 0.092 per cent oxygen. The American analysis showed 0.009 per cent oxygen. Dr. Stead has informed the author that for another ingot iron he has obtained before deoxidation 0.07 per cent oxygen and after deoxidation 0.02 per cent oxygen.

A specimen of iron which had remained under a highly oxidizing slag for many hours in a basic open-hearth furnace was sent to the author by W. J. Brooke, of the Shelton Iron, Steel & Coal Company. In this case all impurities had been practically eliminated by the strong oxidation, and assuming that sufficient time had been allowed for the oxide added to dissolve to saturation in the bath, and for the excess to float up and enter the slag, the metal probably contained as much oxide as it could hold without the presence of suspended globules of oxide. The sample, on analysis, yielded:

	Per Cent
Carbon .....	0.022
Manganese .....	0.034
Sulphur .....	0.038
Phosphorus .....	0.008
Oxygen .....	0.092

If it be assumed that in this case the bath was saturated with oxide and contained no oxide in suspension, then, calculating oxygen as FeO, the figure 0.405 per cent FeO is obtained for the solubility of oxide of iron in liquid metal. In this place it may be interesting to recall the blown Bessemer metal, No. 8, which contained 0.077 per cent of oxygen and was probably not completely saturated.

The foregoing figures for ingot iron may be considered definitely to prove that oxide of iron is soluble

Oxygen in Crucible Steel						
No.	Carbon, Per Cent	Man- ganese, Per Cent	Silicon, Per Cent	Sulphur, Per Cent	Phos- phorus, Per Cent	Oxygen, Per Cent
38*	0.38	0.44	4.71	0.034	0.022	0.001
39	1.14	0.38	0.068	0.020	0.023	0.017
40	1.20	0.36	0.108	0.020	0.021	0.001
41	1.48	0.67	0.072	0.020	0.021	0.008

\*Aluminum = 1.55 per cent.

Oxygen in Wrought Iron						
	Carbon, Per Cent	Manga- nese, Per Cent	Sili- con, Per Cent	Sul- phur, Per Cent	Phos- phorus, Per Cent	Oxy- gen, Per Cent
Swedish .....	0.05	0.07	0.02	0.01	0.02	0.214
Unknown .....	0.022	0.071	0.112	0.026	0.234	0.510
Unknown .....	0.026	0.066	0.115	0.023	0.226	0.603
Best Yorkshire....	0.122	0.02	0.05	0.010	0.05	0.136

Oxygen in Ingot Iron						
	Carbon, Per Cent	Manga- nese, Per Cent	Sili- con, Per Cent	Sul- phur, Per Cent	Phos- phorus, Per Cent	Oxy- gen, Per Cent
American .....	0.040	0.040	nil	0.020	0.004	0.092
English— Before deoxida- tion .....	.....	.....	.....	.....	.....	0.092
Before deoxida- tion (Dr.Stead) .....	.....	.....	.....	.....	.....	0.07
After deoxida- tion (Dr.Stead) .....	.....	.....	.....	.....	.....	0.02

metal it is impossible to state. Taken in conjunction with the fact that no sample of gray iron examined by the author, or by other investigators, except Johnson's special irons, has been found to contain oxygen even up to 0.01 per cent, it is reasonable to conclude that the rapid chilling has the effect of locking up carbon monoxide which would otherwise escape. It is obvious that the slight difference in oxygen percentage is incapable of explaining the difference between the quality of these two specimens—indeed the difference

between the respective percentages in the two samples of the other constituents is incomparably more significant. The chief interest attaching to the results is that they show that oxygen is present in material from which it has hitherto usually been assumed to be absent; and that an amount of oxygen which would be important if found in steel may exist in material containing even such, comparatively, large amounts of silicon, carbon, and manganese, as commercial cast irons.

The influence of oxygen on the properties of steel has so far been chiefly a matter of conjecture. Cushman and also Law consider that oxygen has a marked effect in increasing the corrosion of the metal through rusting. Law found that plates of ordinary steel were corroded in London atmosphere at a rate 24 per cent greater than were plates of similar steel deoxidized by adding fair amounts of ferrosilicon.

Campbell states that since the ductility of open-hearth steel increases as the composition of pure iron is approached, oxygen cannot have a very great deleterious effect, since it will be high in the purer and more ductile irons. He even speculates that oxide of iron may confer abnormal adhesive power. Bradley Stoughton, on the other hand, takes an opposite view. In his "Metallurgy of Iron and Steel" he states: "Oxygen occurs in iron and steel as FeO and Fe<sub>2</sub>O<sub>3</sub>. In either form its presence is very harmful, producing brittleness in both hot and cold steel, besides causing liability to blowholes. . . . There is probably no constituent more harmful to steel than oxygen. . . . the effect of oxygen is somewhat similar to that of sulphur, and, in common parlance, makes the steel 'rotten.'"

It is evident from these opinions that the effect of oxygen on steel is a matter of dispute, and while endeavoring to keep an open mind on the subject we may consider here a few examples of materials which have proved unsatisfactory in use, for whose failure no obvious reason offered itself except the presence of oxygen.

#### STEEL FAILURES DUE TO OXYGEN

In some cases it has been possible to obtain specimens of satisfactory material similar to those which have failed, and when these have been found to contain less oxygen than the unsatisfactory material there is ground for supposing oxygen to be connected with the cause of failure. In many cases, however, no noteworthy difference could be found between oxygen percentages in good and bad material, and accordingly these failures could not be taken as evidence of the harmful effects of oxygen, and have not been included here.

A specimen of steel which had given rise to "non-sizing" in wire-drawing, together with another steel practically identical in composition but perfectly satisfactory in this respect, was referred to the author with the following results:

	Oxygen, Per Cent
"Non-sizing" specimen .....	0.021
Normal specimen .....	0.012

Analysis and numerous mechanical tests of a searching character had been carried out on the specimens before the determination of oxygen, but had failed to bring to light any difference to which the defect could reasonably be attributed.

In several machines in which a certain part was subjected to jarring strain, and occasional rapid and irregular alterations of stress, one of these parts fractured unexpectedly. The material from which it was manufactured had the following analysis:

	Per Cent		Per Cent
Carbon .....	0.35	Phosphorus .....	0.035
Manganese .....	0.64	Sulphur .....	0.035
Silicon .....	0.29	Nitrogen .....	3.30

and the fractured part agreed almost exactly in composition with similar members which did not break. On carrying out estimations of oxygen in the broken piece, and also in the satisfactory material, the following results were found:

	Oxygen, Per Cent
Broken part .....	0.022
Satisfactory part .....	0.008

The figures suggest strongly that oxygen was to blame in this case.

The author was favored by the North-East Coast Institution of Engineers and Shipbuilders with a specimen from a consignment of ship plates which had failed mysteriously. On analysis the specimen gave the following figures:

	Per Cent		Per Cent
Graphite .....	trace	Sulphur .....	0.108
Combined carbon .....	0.06	Phosphorus .....	0.091
Manganese .....	0.611	Arsenic .....	trace
Silicon .....	0.008	Oxygen .....	0.035

Unfortunately a comparison specimen of good material was not available. In the author's opinion the oxygen percentage is dangerously high and likely to produce bad effects, but in view of the rest of the analysis, particularly as regards sulphur and phosphorus, it would be unwise to attribute the failure to this cause alone.

The analysis of another sample of ship plate, sent by S. A. Houghton, which failed unaccountably, has already been published, but is not out of place to refer to it again here. In this case the general analysis was much better and the oxygen lower:

	Carbon, Per Cent	Silicon, Per Cent	Manganese, Per Cent	Sulphur, Per Cent	Phosphorus, Per Cent	Oxygen, Per Cent
Outside .....	0.225	0.082	0.598	0.04	0.054	0.017
Inside .....	0.22	0.094	0.594	0.039	0.052	

Here again, since it is evident from the many results given that oxygen need not exceed 0.01 per cent. in first quality material, this element is at least suspect.

A specimen of acid open-hearth steel which was required to withstand very heavy sudden blows soon after putting into service broke suddenly into a number of pieces. Analysis showed:

	Per Cent		Per Cent
Carbon .....	0.45	Sulphur .....	0.032
Silicon .....	0.20	Phosphorus .....	0.038
Manganese .....	0.77	Oxygen .....	0.050

The oxygen is seen to be exceedingly high for this class of material, while the remainder of the analysis is irreproachable. Microscopic examination failed to detect any error in heat treatment. The conclusion that oxygen was accountable for this failure seems therefore justified.

#### SUMMARY AND CONCLUSIONS

The results from ingot iron indicate 0.405 per cent FeO for the solubility of ferrous oxide in liquid steel nearly free from other elements.

The results obtained all point in one direction—that oxygen in steel, if exceeding 0.01 per cent, tends to produce brittleness under shock. The problem is one of unusual difficulty since the straightforward method of making a direct comparison between steels similar in every respect except oxygen content, and mechanically and microscopically testing them to discover in what respects they differ, is practically impossible. The only method available appears to be to test actual failures and compare them with normal material of the same class, the solution of the problem being consequently a slow matter.

Against the above conclusion it may be urged that many wrought irons and "ingot" irons are not at all brittle under shock. But here it must be borne in mind that the practical absence of carbon from these materials produces a profound difference in character, and it is very likely that the effect of oxygen on nearly pure iron will differ from its effect on steel.

#### Non-Corrosive Alloy for Valves and Fittings

A special non-corrosive alloy suitable for valves and fittings where sulphuric acid or sulphurous compounds are used, as well as on fireline standpipe equipment, has been placed on the market by the M H-Aterite Company, 55 John Street, New York. One of the special advantages claimed for the use of this material in the latter case is that fittings made from it do not require polishing as is the case with those made of brass or bronze or plated with nickel. Three standard finishes are supplied which resemble cast iron, burnished steel and nickel plating, although almost any surface finish desired can be supplied.

## Cooled Drinking Water for Shops

One method of supplying cold drinking water in the shop, particularly by means of the bubbling type of fountain, is to pass the water as needed through a coil of the water-supply pipe submerged in melting ice. Apparatus has been built for this purpose, arranged under the floor level, or in the more or less portable type above the floor. The construction of these water coolers was recently illustrated in *Metal Worker, Plumber and Steam Fitter* and from that journal the following notes have been taken:

Where conditions require the placing of the water cooler underground so that it will be out of the way and not interfere with the shop equipment, it can be ar-

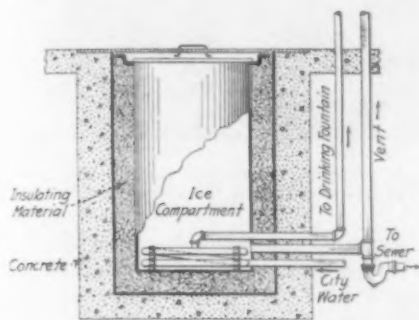


Fig. 1—Type of Water Cooler for Use Underground

ranged as shown in Fig. 1. For an ice capacity of 100 lb., which is a size commonly used and found satisfactory, an ice compartment of 20 x 36 in., which is the inner tank or can, is required. The outfit consists of two No. 20 to 18 gage galvanized tanks set inside of each other and separated with an insulating material which may be hair-felt or mineral wool but preferably granulated cork. This insulation should be from 4 to 6 in. thick in order to effectively retain the cold given off by the ice which cools the water passing through the coil. Double covers are also necessary. The outside cover may be of cast-iron or wood and is set in a curbing fixed in the floor. A loose handle should be provided as shown so that it may be dropped into position to be level with the floor when not in use.

The ice compartment of the cooler shown in Fig. 1 is provided with two or three turns of brass pipe coil formed in a spiral so that the whole bottom is practically covered. The pipe is supported vertically on stands or clamps made of strap iron. If water is allowed to penetrate the insulation, it will lose its value and in time rot away. For this reason the outfit should be in a concrete pit which has been waterproofed. A pit having 6-in. sides and a 4-in. bottom will be found satisfactory.

Instead of the underground cooler, a portable type water cooler for use in the factory or shop as shown in Fig. 2 may be found more desirable in a good many

cases. This cooler is usually made with an ice compartment of 12 x 16 in. so that it will not be bulky and will present a neat appearance. It is built in a manner similar to the underground cooler, having two galvanized tanks separated with 4 to 6 in. of insulating material, and the top covered with a removable lid. Inside the ice compartment a spiral coil as before may be used but preferably a coil encircling the inside part close to the walls of the inner tank and wound the full height should be employed. While block tin coils are sometimes used with a screen around them for protection against damage, a brass pipe cooling coil will be found more serviceable.

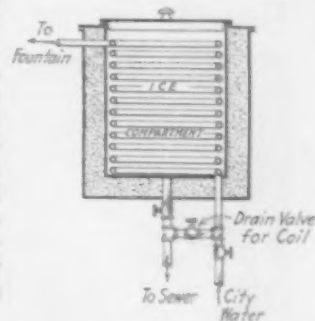


Fig. 2—Portable Type of Water Cooler Suitable for Many Conditions

While iron pipe coils are more substantial their transmitting value at the relatively low temperatures handled in cooling drinking water is very low. For this reason brass pipe is used extensively. To approximately determine the amount of coil required for a given service, it may be readily determined by dividing the gallons used during an hour by two, which will give the square feet of brass coil surface or  $\frac{1}{2}$  sq. ft. of brass coil surface is necessary for 1 gal. an hour. Thus, for 100 gal. an hour 50 sq. ft. of coil will be necessary.

Some typical installations in which the portable cooler may be employed are shown in Fig. 3, in which the outfits illustrated represent standard fixtures made by the Manufacturing Equipment & Engineering Company, Boston, Mass.

## Razing a Village for Manganiferous Ore

U. S. Consul Talbot J. Albert, of the Brunswick district in Germany, reports that one of the greatest difficulties of German steel manufacturers has been the scarcity of manganese ore. The ore used by the Ilseder Hütte blast furnaces in that district near Peine is sufficiently high in manganese to be shipped to other plants in Germany as a substitute for imported manganese ore. The demand has been so great that a part of the village of Adenstedt with its church has had to be demolished. The Ilseder company has recently declared a dividend of 33  $\frac{1}{3}$  per cent, which the annual report states is due principally to the sale of this ore.

The Providence Engineering Society will occupy new rooms at 29 Waterman Street, Providence, R. I., when it opens up for the fall and winter activities next September. The whole second floor of the building has been taken and is to be remodeled. Albert E. Thornley, P. O. Box 796, is corresponding secretary.

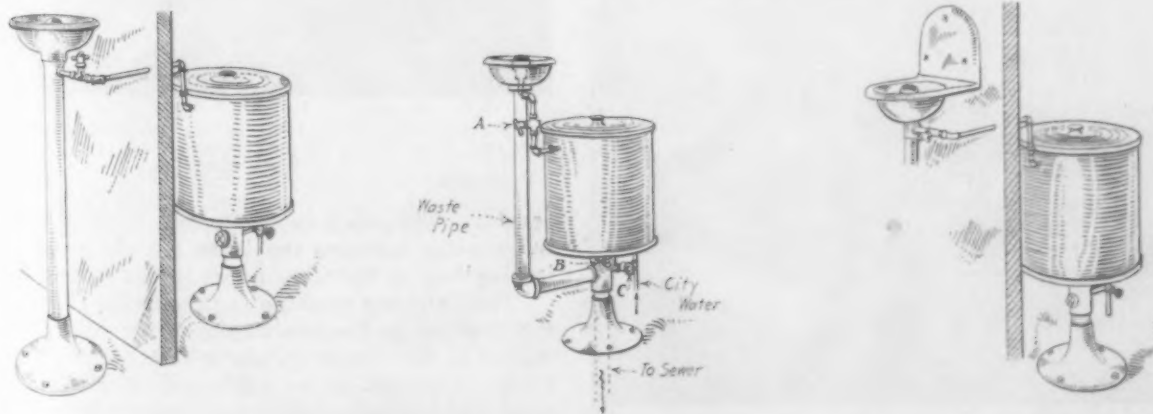
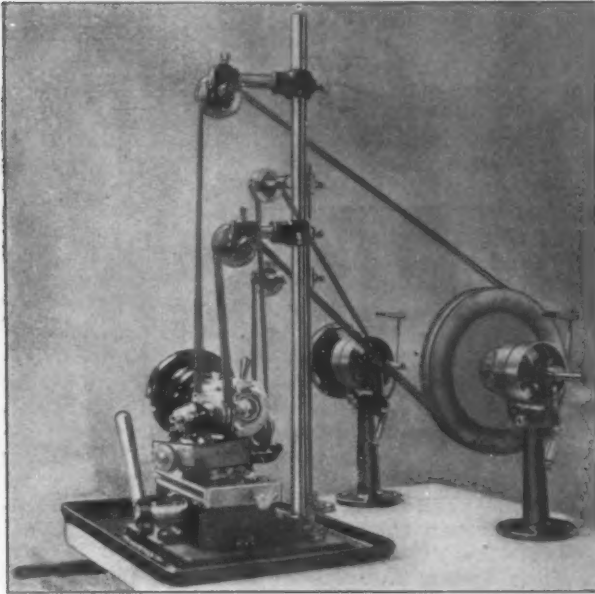


Fig. 3—Three Typical Arrangements Showing How a Portable Type Water Cooler May Be Employed



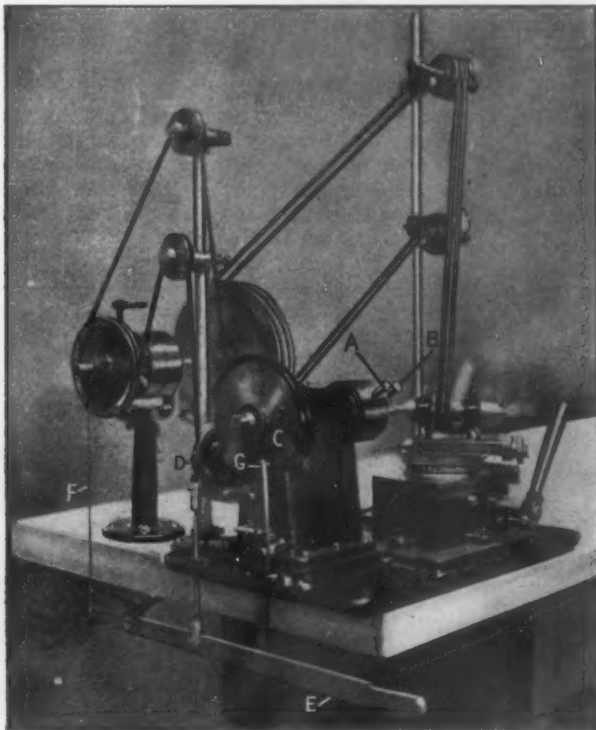
### Machines for Routing Powder Grooves

Two machines for routing powder grooves in the time train rings for 80 and 85 fuses have been recently completed by the American Machine & Foundry Company, 346 Carroll Street, Brooklyn, N. Y. These machines were designed by E. A. Lundwall

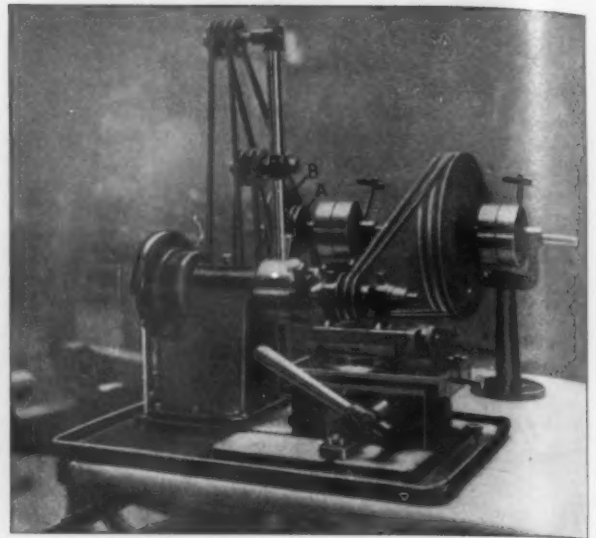


The Roughing Machine in Which the Groove Is Cut Out with a Circular Milling Cutter Mounted on a Spindle Set at an Angle with the Work

for the International Arms & Fuze Company and were built under his supervision. The two machines operating together will produce a completely grooved ring every 20 sec. The first machine is designed to take the brass ring and rough out the groove, while the other is intended to complete the work of the first machine and turn out a smoothly finished groove. Although this is the general scheme of operation, it is possible in some cases to do the entire operation on the roughing machine.

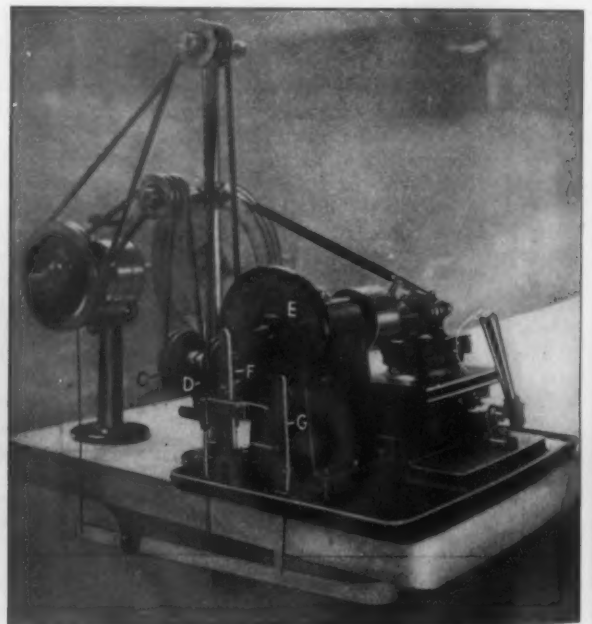


The Index Plate and Starting Lever of the Roughing Machine in the Foreground with the Cutter Spindle Set at an Angle to the Right behind the Chuck



The Finishing Machine with the Double Belt Drive for the Cutter Spindle Which Operates at 8000 R.p.m.

The roughing machine has the cutter spindle mounted at an angle and employs a circular cutter running at 4500 r.p.m., which removes stock so that the roughing operation is completed in 10 sec. In operation the ring is placed in the chuck, the jaws of which close against the work and also move back to hold it firmly in place when the chuck closing handle *A* is pulled. The handle *E* below the table is raised to shift the driving belt from the loose to the tight pulley through the action of the rod *F*. This operation also releases the locking bolt from a slot in the periphery of the index plate *C*. The spindle, which is driven by a friction worm, is now free to



The Special Index Plate Used on the Finishing Machine to Stop and Start the Work and Provide Two Different Rates of Work Speed

revolve. The machine is stopped by a pin in the index plate striking the lever *G*, which seats the locking bolt in the other notch in the index plate.

The finishing machine is practically the same in construction as the one employed for roughing, except that the cutter spindle which rotates at 8000 r.p.m. is not set at an angle with the face of the work and has a special type of index plate for automatically controlling the engagement of the fast speed provided. This machine removes the circular

corner left in the groove by the roughing cutter, the work traveling during this operation at a slow speed, and when this has been accomplished the speed of the work is automatically doubled for finishing the central portion of the groove. As the cutter approaches the other end of the groove the work automatically slows down for the removal of the corner at that end and stops when the pin *E* strikes the lever *G*. The different rates of speed are provided by two clutches controlled by pins on the index plate. The stopping and starting of the work is controlled in the same way as in the roughing machine, but the operation of the clutches, one of which can be seen above *D*, is controlled by the contact made by the speed lever *E* with the other set of pins on the index plate.

The machines are designed for bench mounting, and are arranged so that one operator can attend to either two roughing or two finishing machines. Each machine will turn out a complete ring every 10 sec., which gives a completed ring every 20 sec.

### Book Reviews

**Mechanical Technology.** By G. F. Charnock. Pages x+635, 6 x 8½ in. Illustrations, 503. Published by D. Van Nostrand Company, New York. Price \$3.

The sub-title, which comes nearer giving a definite idea of the scope of the book than does the title itself, is "Materials and Preparatory Processes of the Mechanical Industries." But even this is vague, for the book deals with iron, steel and the non-ferrous metals. The author set out to contrast mechanical with chemical technology and has tried to bring together in one volume a connected and systematic account of the chief operations underlying mechanical trades and handicrafts.

One-fourth of the contents deals with the production and properties of the metals and alloys, another section with their molding and casting, and a third with various mechanical operations involving their change of shape by forging, stamping, rolling, drawing, spinning, pressing, etc. Besides there are chapters on timber, stone, lubricants, abrasives, rubber, leather, rope, etc.

The part of the work appealing most to metallurgists and chemists is that on mechanical working which is a creditable and condensed statement. As to mechanical practice, that described is mostly English, which lessens its practical value to American readers.

**Poor's Manual of Public Utilities.** Text pages, 2500, 5½ x 8½ in. Published by Poor's Railroad Manual Company, New York. Price, \$7.50.

This is the fourth of these annual volumes and is the largest yet published. It gives complete and recent financial statements of practically all the public utility companies in the United States and Canada in which there is public interest. A new feature is the "margin of safety" over interest or dividend requirements of individual stocks and bonds. This margin is a practical rating of securities based on facts. It answers the question, "What is the risk involved?" The general information is revised to June 15, 1916; income accounts and balance sheets are as of Dec. 31, 1915, and some as late as April 30, 1916. Illustrating the completeness of the work, it devotes 39 pages to the American Water Works & Electric Company; 34 pages to the United Gas & Electric system; 67 pages to the United Light & Railways system; 30 pages to the Middle West Utilities system; and 33 pages to the National Properties Company.

**Steel and Its Heat Treatment.** By D. K. Bullens. Pages vii+431, 6 x 9¼ in. Published by John Wiley & Sons, New York. Price \$3.75 net.

The author has dealt with the theoretical and practical sides of the subject of steel and its heat treatment so as to make it clear and easily understood. Seventeen chapters are devoted to a "heat talk," rather than a "furnace talk," as the author expresses it—to heat

application rather than details of construction. Charts and photomicrographs, 223 in all, are supplied. Besides the testing and structure of steel, annealing, hardening, tempering and carburizing, there are chapters on heat generation and application, and the important alloy and tool steels. The book concludes with a chapter on pyrometers and critical range temperatures. The work is systematically put together and is valuable both as a text book and a book of reference.

**Questions and Answers Relating to Modern Automobile Design, Construction, Driving and Repair.** By Victor W. Page. Pages, 701, 5¼ x 7½ in.; illustrations, 387. Published by the Norman W. Henley Publishing Company, 132 Nassau Street, New York. Price \$1.50.

With each revision of this book, which is now in its fourth edition, the size has been increased until it now contains 39 lessons, consisting of over 2000 questions and answers dealing with the automobile, its construction, operation and repair. It is written for the practical, non-technical man. All of the latest 1916 developments are included, with a complete discussion of electric starting and lighting systems.

The arrangement is practically the same as in the former editions, dealing first with the motor, its parts and their functions, the fuel used and its explosion in the cylinders to produce power followed by a discussion of ignition, lubrication and cooling. The various types of transmission are touched upon and descriptions of the frame, steering gear, wheels and bearings follow. Instructions on the operation of a car and a description of the troubles frequently encountered, their symptoms and the remedies, are given. The development of the 1916 automobile design is described briefly and information on winter driving is contained in the final lesson.

The Titanium Alloy Mfg. Company, Niagara Falls, N. Y., has published a book of 105 pages, 5½ x 8½ in., with the title "Titanium in Steel Making," the object of which is to show the benefits of titanium additions to various steel products. After an introductory chapter on the use of the alloy in steel making there are chapters on steel castings, forging steels, structural steels, rails, sheet and plate steels, wire steels, pipe and tube sheets, bronze castings and titanium-aluminum bronze castings. A section is devoted to a study of alumina in steel and its determination, as well as the preparation of wire samples for microscopic examination. The book is well illustrated with photomicrographs.

The "Use of the Slide Rule" is the title of a book of 36 pages by Allan R. Cullimore, published by the Keuffel & Esser Company, 127 Fulton Street, New York. The book is the result of sets of notes issued by the author in his work at the College of Industrial Science, Toledo University, in teaching the use of the slide rule to engineering students, and men of more or less practical experience. Directions are included covering the use of the slide rule in equivalent ratios, multiplication and division, the use of the inverted slide, general involution and evolution and trigonometric computations. Particular attention is also paid to the solution of special formulae.

The Carnegie Steel Company, Pittsburgh, has issued the third edition of its pamphlet entitled, "Gear Blanks and Miscellaneous Circular Sections." It covers the solid rolled-steel circular sections made at the Slick steel plant of the company for use as gear blanks, automobile flywheels, piston blanks, pipe flanges, shaft couplings and mine locomotive, industrial and railroad car and crane track wheels. Standard specifications covering the manufacture of the several products are given and the text is supplemented by numerous drawings and tables of the various sizes of each that can be supplied.

An exhaustive account of peat development in Canada is found in Bulletin No. 11, "Investigation of the Peat Bogs and Peat Industry of Canada, 1913-1914," by Aleph Anrep and published by the Canadian Department of Mines.



## MAKING FLANGED SHAPES

### A New Method to Secure a Slabbing Action, Patented by E. E. Slick

A new method of rolling flanged shapes, such as I-beams, has been patented by Edwin E. Slick, vice-president and general manager of the Cambria Steel Company, Johnstown, Pa. In the process of rolling, the web is bent in more or less of a curve away from the central straight axis which it is finally to

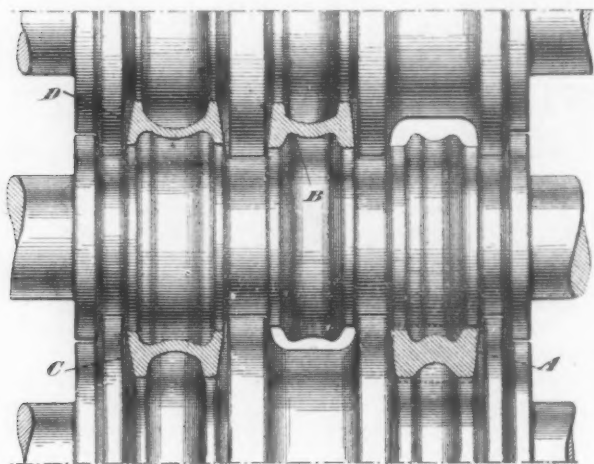


Fig. 1—Rolling May Start with a Rectangular Bloom, as at A, the First Roughing Pass. In the three succeeding roughing passes the bar is not turned over

have, and in each successive pass it is bent in the opposite direction from that which it had in the preceding pass. In other words, the plan is that the bar is not turned between passes, but the web is first bent in one direction and then in the other. The flanges are likewise inclined in opposite directions from pass to pass, as compared with their previous positions, as is indicated in the illustrations, and in thus bending the web, the bending of the flanges is allowed for without local distortion. The particular and novel feature of the invention is that the method allows for drawing or reducing the thickness of the flanges by a slabbing action owing to the fact that the pressure on these flanges is in a direction inclined to the roll axes. Thus the flanges

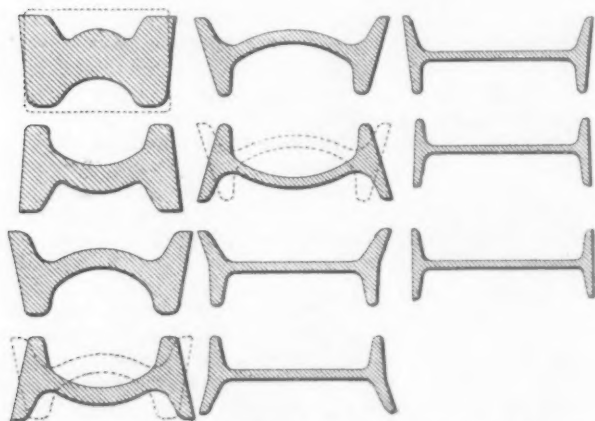


Fig. 2—The Steps in Rolling an I-Beam from a Rectangular Bloom. The bar is not turned over between passes, and the dotted lines indicate the shape as received, for example, at different passes

are maintained at the length desired, as otherwise they would be pulled down by wire-drawing action as the web is reduced in thickness and would not give the final cross-section form desired. The patent was granted June 22 and is No. 1,143,735.

For the purposes of illustration, an elevation of a sketch of three-high rolls, say the roughing set,

is shown with the first four passes or grooves therein. One may note the first pass, which receives a rectangular bloom, indicated in dotted lines. The bloom is reduced to the general form of the shape to be rolled, with rudimentary webs and flanges. The web is of course thick and the flanges likewise. The web also takes on the bend and the rudimentary flanges are inclined as regards the position which they will finally take. The second, third and fourth passes are indicated, and the point to be remembered is that the bar is not turned over between the passes, so that the web is bent in the opposite direction from the curve which it took in the preceding pass, and likewise the flanges are allowed to take on the inclination corresponding to the bend of the web and are accordingly subjected to the slabbing pressure.

In Fig. 2 may be seen the passes from the time the steel reaches the rolls in the shape of a bloom to the finished I-beam. The dotted lines in the three cases show the section of the piece as received in those passes.

A structural mill equipped with rolls for this method requires only rectangular blooms which can be supplied from a standard slabbing or blooming mill without making roll changes, and without carrying the usual large supply of shaped rolls for blooming mill. This also eliminates the delay of roll changing and a large investment in blooming mill rolls. This method of rolling shapes has an advantage, when additional blooms are required for new orders or a shortage, that they can quickly be secured without change of blooming mill rolls.

### Kerosene as a Substitute for Gasoline

That the development of new processes for making gasoline is not a solution of the problem of the high price of fuel for internal combustion engines is the belief of Prof. Charles E. Lucke, Columbia University, expressed in a paper read at the semi-annual meeting of the Society of Automobile Engineers, June 16. The solution of the problem will be found, he holds, in the development of an apparatus which will enable kerosene to replace gasoline as an internal combustion engine fuel.

The development of satisfactory means of utilizing kerosene will entirely change the situation from every standpoint. It will produce results satisfactory to everybody, which is impossible by any other procedure. The new cracking processes for the manufacture of gasoline do not constitute a satisfactory solution for three principal reasons: 1. Kerosene cannot be removed from the market because it is an old commodity and the most perfectly distributed oil product in the world's market. 2. The cost of installing new plants involves millions of dollars, which must be carried by the new product. 3. All new cracking processes are patented and the rights are not available to everybody. Therefore, some refineries must continue as they are or be forced out of business by those commanding both the capital and patent rights for the new processes.

Kerosene utilization appliances are more worthy of development than are new oil cracking processes. Their perfection will constitute a true and sound solution of the present automobile fuel price. The use of kerosene in standard gasoline equipment does not produce what can be regarded as satisfactory results from the operating standpoint because even in addition to the requirement of gasoline for starting purposes the kerosene is vaporized to so small an extent. No particular knowledge of the properties of vapors or of vapor-air mixtures is required to realize that the sort of corrective needed is heat, but it makes all the difference in the world just how that heat is applied.

George T. Johnson & Co., dealers in iron, steel, coal and coke, have moved their offices from the Commercial Trust Building, Philadelphia, to the new Widener Building, Chestnut and Juniper streets.



## IMPORTANT CUSTOMS DECISION

### Protective Feature of Tariff Law Upheld in a Castings Case

Changes in the tariff law at the last revision, and intended apparently to give some protection to American products, were made effective in a decision rendered last week by the Board of United States General Appraisers in the protest case of Simon, Buhler & Baumann, Inc., New York. The appraiser's report described the merchandise, the subject of protest, as brewing mash filtering machines, complete with the exception of brass, bronze and rubber fittings and filtering cloths. They were composed of iron castings, molded, drilled and machined.

The machines were returned for duty under the present tariff at the rate of 20 per cent as "manufactures of metal not specially provided for," although the appraising officer said in his report to the board that the importations, which were from Germany, were of the same character as those held by the United States Court of Customs Appeals in the Lang case to be properly dutiable at 10 per cent. The importers asked entry at 10 per cent under paragraph 125 of the act of 1913, which among other things enumerates "castings, including all castings of iron or cast-iron plates which have been chiseled, drilled, machined, or otherwise advanced in condition by processes or operations subsequent to the casting process but not made up into articles or finished machine parts."

Judge Fischer, in his decision for the board, approved by the other members of the tribunal, found against the claim of the importers for duty lower than assessed. The general appraiser pointed out, to begin with, that the decision referred to in the report of the New York appraiser, and upon which that officer apparently based his conclusion that the articles in question would now be properly dutiable as castings under paragraph 125, was rendered in a case arising under the tariff act of 1909. That case, known as Lang vs. United States, brought before the court for judicial interpretation the language of paragraph 147 of that act—the immediate predecessor of the present paragraph 125. Judge Fischer said the wording of the old and new paragraphs—at least, in so far as the provisions in any way pertinent hereto are concerned—is substantially if not literally the same, save for the additional exception from the operation of the present provision which Congress evidently saw fit to make when it added thereto the words "or finished machine parts." This language is new and not found in the corresponding provision in paragraph 149 of the last preceding act.

"In so doing," continues the decision, "the conclusion is inevitable that Congress, having in mind the decision of the United States Court of Customs Appeals in the case of United States vs. Leigh & Butler, cited in the case of Lang vs. United States, intended to meet and overcome the effect thereof, in so far as iron or steel castings of the kind therein passed upon by the court were concerned, by adding to the new provision language which deliberately and specifically excluded from the scope of such provision not only such castings as were made up into articles, but also such castings as were shown to consist of finished machined parts. Hence, it follows that not only is the case cited by the appraiser as an authority herein wholly inapplicable to the present merchandise, but as a result of the change in the new provision the merchandise which the court held to be properly within the purview of paragraph 147 of the act of 1909 would now be excluded from the present castings provision by virtue of the very terms thereof."

Another point, however, was raised by the importers at the hearing. They insisted that the articles in question, being parts of a brewing mash filter, are more accurately described as parts of an apparatus than as parts of a machine, and that consequently the words of exclusion added to the provision of paragraph 125 can have no possible application to the shipment involved in the controversy. In reply to this contention the board's decision said it would be seen that the

court in the Lang case considered and treated articles admittedly the same as those here under consideration as finished machine parts. In addition, the decision held that for the board to hold that the article for which the parts under consideration are intended is an apparatus and not a machine "would certainly be drawing a very fine line of demarcation, especially since the common and ordinary meaning of the word 'apparatus,' as set forth in the dictionaries, is unquestionably broad enough in scope to include a machine."

The decision concluded: "We therefore find as a fact that the articles in question are castings of iron which have been advanced to the point where they have become finished machine parts. This finding necessarily requires that they be excluded from the provisions of paragraph 125; and inasmuch as they are not elsewhere specifically provided for, we hold that said articles are properly relegated for tariff classification to the general provision in paragraph 167 for manufactures of metal not specially provided for, and as such dutiable thereunder at the rate of 20 per cent ad valorem, as classified by the collector."

Officials of the Department of Justice gave it as their view that the board's decision would be affirmed by the Customs Court, thereby laying down the principle of classification for a wide variety of imported goods.

#### TANTIRON

The board has laid down the rule to govern importations of so-called Tantiron, a special foundry product. The question of classification under the present tariff was raised in appeals made by John H. Faunce and Koons, Wilson & Co., who made importations at Philadelphia. The Government contended that the product was ferrosilicon. The collector's assessment objected to was at the rate of 15 per cent as "ferrosilicon and other alloys used in the manufacture of steel not specially provided for." The protestants claimed the merchandise to be free of duty under paragraph 518 specifying "iron in pigs." The proof submitted in support of the contention for duty exemption showed that the imported merchandise consisted of a species of iron with high silicon content, and that it was known as Tantiron and not as ferrosilicon.

It was also brought out that the alloy in controversy was prepared for the special purpose of casting into bowls and like articles suitable for commercial chemical uses, the silicon, manganese and other constituents giving it the necessary power of resistance to fit it for those particular uses. It was also established at the hearing that ferrosilicon, by reason of the absence of appreciable quantities of manganese, was very brittle and therefore incapable of being manufactured into articles, and that its only use was in the production of certain grades and qualities of steel by admixture. The collector was reversed and a reliquidation ordered on the basis of free entry.

#### SCRAP ZINC

Bouza, Potts & Co., Havana, shipped scrap zinc to New York, which the customs officials advanced on the ground that the entered prices were below market value. According to the official papers in the case, old scrap zinc was entered as having a value of \$8 per 100 lb. and new scrap zinc, \$9 per 100 lb. The customs examiner was dissatisfied with these prices and raised them for duty purposes. At the hearing the importers presented convincing proof that the values as entered represented Havana market prices on the date of shipment. The general appraiser who heard the case reversed the New York officials and allowed the merchandise to enter at the prices mentioned above.

A plant for the manufacture of ferroalloys is to be established at Highlandtown, Md. The name under which it will be operated has not been decided upon, but probably will be the Electro Metallurgical Company. Konstantin Jouvraeff, New York, heads the enterprise. The plant will cover about an acre. Otto G. Simonson, architect, Maryland Casualty Building, Baltimore, is preparing the plans. Work is to be rushed.

### Death of Charles Kirchhoff

After a long period of ill-health Charles Kirchhoff, for many years editor in chief of THE IRON AGE, died July 22 at his summer home at Wannamassa, near Asbury Park, N. J., aged 63 years. The immediate cause of his death was a complication of ailments following an attack of the grip. He leaves his widow but no children. He was born in San Francisco, Cal., where his father was established at that time in the German consular service. The family a few years later removed to Hoboken, N. J., where Charles attended the public schools, continuing his education at the Royal School of Mines, Clausthal, Germany, from which he was graduated as mining engineer and metallurgist in 1874. After serving three years as chemist with the Delaware Lead Refinery, Philadelphia, he joined the editorial staff of the *Metallurgical Review* upon its establishment in 1877 by David Williams, publisher of THE IRON AGE. This periodical had only a brief existence. For a few years subsequently he alternated editorial connection with THE IRON AGE and the *Engineering and Mining Journal*. He was managing editor of the latter paper from 1881 to 1884, when he permanently returned to THE IRON AGE staff as associate editor, becoming editor in chief in 1889, on the retirement of Dr. James C. Bayles. On the death of John S. King, business manager, in 1904, Mr. Kirchhoff added to his editorial duties those of general manager of the David Williams Company, continuing to discharge the responsibilities of both positions until the change of ownership of the company in 1909.

Although Mr. Kirchhoff was assiduous in the conduct of his task as editor of the world's greatest trade paper, and under his direction its growth expanded and its power and influence greatly increased, his achievements in this direction brought to him other duties which were discharged with equal credit to himself. He was elected president of the American Institute of Mining Engineers in 1898, and his fellow members thought so well of what he had done for them in that period that in 1911 they for a second time bestowed upon him the honor of the presidency. He was called upon by the United States Geological Survey to collect the annual statistics of the production of copper, lead and

zinc and acted as special agent in this work for a period extending from 1883 to 1906. He served in an official capacity on committees organized to receive and entertain the members of the Iron and Steel Institute and of the Verein Deutscher Eisenhuettenleute in visits to this country made in 1890 and 1904. He was secretary of the American committee in 1890 and chairman of the committee in 1904, and on both occasions his efficiency in looking after the details was the subject of high encomiums by the visitors. He made quite frequent trips to Great Britain, Germany and France for the purpose of studying developments in the iron and steel industries abroad and contributed numerous articles to THE IRON AGE while engaged in this work. One of the most extensive series of articles of this character entitled "Notes on Some European Iron Making Districts," was republished in 1900 in book form and had a wide circulation.

Mr. Kirchhoff spared neither time nor labor in keeping himself in touch with developments in all sections of this country. If some new enterprise was started which promised further progress in metallurgy or mechanics, he endeavored to make a personal inspection or investigation of it. His acquaintance with men and processes thus steadily broadened, and in the progress of years his reputation grew as an authority on practically everything connected with the manufacture of iron and steel. His name was a familiar

one in the iron trade of Europe as well as America. He had an important advantage over many others in conducting international correspondence and in visiting foreign countries as he was an accomplished linguist, speaking and writing several languages fluently.

His retirement from active business life, which occurred in 1910, was regarded with much regret by his numerous friends, as he apparently had before him many further years of usefulness. On the afternoon of Jan. 16, 1910, a luncheon was given to him at the Engineers' Club, New York, by a large number of his friends who in that manner sought to pay him a tribute of their admiration and regard. Members of the iron and steel trade from all over the United States gathered to show their esteem and to speak in praise of him. Numerous letters abounding in eulogies were read from others who were unable to attend. Among those present was the late



CHARLES KIRCHHOFF



John Fritz of Bethlehem, who was at that time 87 years old, yet had made the journey from his home to New York City for the special purpose of showing his admiration for the retiring editor. He spoke with emphasis of the part contributed by Mr. Kirchhoff to the advancement of the American iron trade. On this occasion a bronze statue was presented to Mr. Kirchhoff by his associates in the David Williams Company.

Mr. Kirchhoff made an important contribution to the columns of THE IRON AGE after his retirement, in reviewing the work of the International Metallurgical Congress at Duesseldorf, Germany, which he attended in the spring of 1910. In October of that year he read a paper before the American Iron and Steel Institute in New York dealing with the recent progress in iron and steel metallurgy in the leading countries of Europe, particularly in Germany, as this progress had been represented in the papers read at the Duesseldorf Congress. This meeting of the American Iron and Steel Institute was attended by a delegation of the leading steel masters of Great Britain, Germany, France and Belgium. In the discussion of Mr. Kirchhoff's admirable paper, which was a leading feature of the meeting, Prof. Henry M. Howe congratulated the institute on such a contribution to its proceedings and particularly on having as a member one so well qualified to appraise the European advance in the manufacture of steel.

Reference to Mr. Kirchhoff's activities in other than editorial fields of usefulness would not be complete without mentioning the deep interest he took in the later years of his life in the work of the American Museum of Safety Devices and Industrial Hygiene. The character of this work appealed strongly to Mr. Kirchhoff, whose heart overflowed with sympathy toward his fellowmen, and for several years he served as chairman of the committee of direction. His services in behalf of the institution and its worthy purposes attracted attention abroad as well as at home, and in 1908 Mr. Kirchhoff and T. Commerford Martin and Percy Stickney Grant, fellow-workers in the cause, were recipients of decorations bestowed by the French Republic through the Minister of Public Instruction and Fine Arts and were made Officiers d'Académie, the ceremony of decoration being conferred by Monsieur Bonzom, acting French Consul General, on the evening of Jan. 15 at the rooms of the Aldine Association, New York City.

Although THE IRON AGE was well established when Mr. Kirchhoff became connected with it, the prestige of the paper grew steadily under his direction, and its reputation became more thoroughly established for enterprise, accuracy and progressiveness. He spared no pains either for himself or his associates in endeavoring to reach and maintain the highest standard. Thoroughly impartial in his own dealings with others, he inculcated independence in all who were in the least responsible for the editorial utterances of the paper. Honest himself, and absolutely free from double dealing, he could not tolerate subservience in others. As a writer, Mr. Kirchhoff had a style peculiar to himself. His expressions were clear cut, and he had the unusual qualification of being a good phrase maker. Few writers could so well express an idea so strongly in as few words. May the impress he has left upon this paper long continue to be felt.

## REPUBLIC SEMI-ANNUAL REPORT

### Best Financial Showing Ever Made by the Republic Iron & Steel Company

The Republic Iron & Steel Company's report for the six months ended June 30, 1916, presents the following comparative statement of income:

	Six Months Ended		
	June 30, 1916	Dec. 31, 1915	June 30, 1915
Net earnings, after charges for maintenance and repairs .....	\$6,779,703.21	\$3,667,901.56	\$1,771,696.85
Interest and dividends received..	43,323.41	154,954.00	28,356.55
Total profit for six months...	\$6,823,026.62	\$3,822,855.56	\$1,800,053.40
Less:			
Provision for depreciation and renewal .....	\$300,327.77	\$336,549.05	\$263,838.75
For extraordinary depreciation ...	200,000.00	400,000.00	.....
For exhaustion of minerals .....	118,171.82	135,670.49	101,127.55
Net profit for the six months...	\$6,184,499.59	\$872,219.54	\$364,966.30
Deduct:			
Interest on bonds and notes .....	436,450.93	442,320.70	427,583.23
Net profit applicable to dividend .....	\$5,768,076.10	\$2,508,315.32	\$1,007,503.87
Add surplus:			
Dec. 31, 1914.....			\$6,615,289.54
June 30, 1915.....		\$7,622,793.41	
Dec. 31, 1915.....	\$8,354,953.66		
Total .....	\$14,123,029.76	\$10,131,108.73	\$7,622,793.41
Deduct:			
Special appropriations from surplus account....		588,655.07	.....
Dividends on preferred stock ...	1,625,000.00	1,187,500.00	.....
Net surplus carried to balance sheet.	\$12,498,029.76	\$8,354,953.66	\$7,622,793.41

Accompanying remarks to stockholders by Chairman John A. Topping are as follows:

"The extraordinary domestic and foreign demand for iron and steel referred to in our annual report under date of Dec. 31, 1915, continued without abatement throughout the six months ended June 30, 1916, present conditions suggesting that demands have not been fully satisfied. Prices, under the stimulus of these unusual conditions, have made substantial advances, present rates closely approximating the record prices established during the year 1899. Labor rates, however, are generally approximately double the 1899 rates, whereas the purchasing power of the dollar has been authoritatively stated as being one-third less than during 1899; yet notwithstanding these favorable conditions, labor unrest is prevalent, our principal works at Youngstown, Ohio, having suffered serious financial loss from a strike shutdown of several weeks during January, 1916, and at the present time operations in the Northwestern iron ranges are somewhat disturbed.

"Notwithstanding the difficulty of conducting operations under the conditions noted, the results have been most satisfactory, the aggregate net profits for the six months ended June 30, 1916, being \$6,204,527.03 and the net profits applicable to dividends, after making the usual deductions for depreciation and maintenance, also provision for depreciation extraordinary, were \$5,768,076.10. While price improvement has contributed largely to the great increase in earnings realized, improvement to property and process, of an economic character, has contributed no small part, and the executive committee of the company, in recognition of this fact, will continue its policy of strengthening operations by further improvements, when expedient or advisable. At the present time various improvements and extensions of an economic character are under way which will call for an expenditure of approximately \$3,000,000. Orders on hand are sufficient to promise full operations at profitable prices during the remainder of the year, but in this connection, it may be of interest to state that only insignificant quan-

The Milton Iron Company, Wellston, Ohio, has been incorporated with \$200,000 capital stock by H. S. Willard, W. R. Davis, J. H. Browne, H. S. Willard, Jr., and A. A. Ferree. The new company will operate Milton furnace, which has been idle for some time.



titles of this company's steel products have been sold for munition purposes, and no investments have been made by the company in munition equipment. The net quick assets as of June 30, 1916, aggregate \$15,560,413.09."

## Judicial Decisions

ABSTRACTED BY A. L. H. STREET

**WARRANTY OF EFFICIENCY OF MACHINERY SOLD.**—In a suit to recover damages for claimed breach of warranty by a seller of induced-draft apparatus as to the sufficiency of draft to be furnished, the seller was not entitled to rely upon inaccuracy of information as to existing draft, furnished by the plaintiff buyer, unless such information influenced the making of a plant of the warranted power. The measure of damages for such breach of warranty is the excess of the value of the apparatus as warranted above its value as installed. An experienced consulting engineer was qualified to testify as to such value, where he had bought 16 similar apparatuses, although he had not bought one of the precise kind, and although he did not know the quantity of structural steel utilized in the manufacture. (United States Circuit Court of Appeals, Sixth Circuit, *B. F. Sturtevant Company vs. Champion Fibre Company*, 232 Federal Reporter, 1.)

**RIGHTS OF CONDITIONAL SELLERS OF BOILERS.**—A boiler manufacturing company which sold boilers to a contractor, knowing that they were to be permanently installed on municipal property, is not entitled to reclaim them after installation, although they were sold under a contract reserving title in the company until payment of the price; the city having paid the contractor for the boilers and installation without notice of the reservation of title. Notice given city officials after the installation, or to officials not concerned in the work, is not binding upon the city. (New York Supreme Court, Appellate Division, *Fitzgibbon Boiler Company vs. City of New York*, 159 New York Supplement, 357.)

**CONTRIBUTORY NEGLIGENCE CONCERNING FREIGHT ELEVATORS.**—There can be no recovery for injury to a machine shop employee attributable to his own negligence in protruding his head into a freight elevator shaft to call down to the operator to bring the platform to his floor, resulting in his being struck by the descending elevator; the injured man having failed to first ascertain whether the car was above or below. (Connecticut Supreme Court of Errors, *Jacko vs. American Tube & Stamping Company*, 97 Atlantic Reporter, 755.)

**VALIDITY OF KENTUCKY COMPENSATION ACT.**—The workmen's compensation act enacted in Kentucky in 1916 is not unconstitutional as infringing the clause of the State constitution which forbids laws limiting the amount recoverable for injuries, since the act is elective as to all employees. Inasmuch as no employer has a vested legal right in the defenses of contributory negligence, negligence of a fellow servant, and assumption of risk, the act is not invalid because it deprives employers of the benefit of these defenses on non-acceptance of the provisions of the law. The act is sustained as against other constitutional objections. (Kentucky Court of Appeals, *Greene vs. Caldwell*, 186 Southwestern Reporter, 648.)

**VALIDITY OF PATENT AS AFFECTED BY PREVIOUS CONTRACTS FOR SALE OF DEVICE.**—A patent for a motor was not invalidated because the patentee contracted for the sale of the first 100 more than two years before the patent was applied for, the contract being subject to the buyer's approval of a sample to be subsequently submitted, which was not done until within the two-year period. (United States Circuit Court of Appeals, Second Circuit, *Burke Electric Company vs. Independent Pneumatic Tool Company*, 232 Federal Reporter, 145.)

**ACCIDENTS AT UNGUARDED MACHINERY.**—In a suit to recover damages for injury to an operator of a stamping machine, claimed to have been left unguarded in violation of a statute, it is for the jury to determine

whether it was reasonably necessary to equip the machine with a safeguard, considering the use to which it was put and the dangers attendant upon its use by the operator, as reasonably to be foreseen. Such statutes as the provision of the New York labor law, requiring dangerous machinery to be safeguarded, are designed to protect against inadvertent acts of the operator, as well as other dangers. The fact that no previous injury occurred at the particular machine may be considered by the jury in determining whether the employer was negligent in failing to safeguard it, but affords no conclusive evidence of due care. (New York Supreme Court, Appellate Division, *Flynn vs. McLoughlin*, 159 New York Supplement, 442.)

**FUNCTIONAL FEATURES NO PART OF TRADEMARK.**—Useful or functional features of a patented article cannot be made the basis of an exclusive trademark on expiration of the patent so as to prevent all manufacturers of the article from using it. (United States Circuit Court of Appeals, Third Circuit, *Daniel vs. Electric Hose & Rubber Company*, 231 Federal Reporter, 827.)

**CONCLUSIVENESS OF WRITTEN CONTRACT.**—A party to a written contract signed by him cannot avoid its effect by claiming ignorance of its terms, unless he was induced to sign it through fraud or mistake. Merely representing to one about to sign a contract that it embodies a previous oral understanding cannot constitute such fraud as will relieve him from his obligations under it, if he is in possession of his faculties and able to read. (Oklahoma Supreme Court, *Ames vs. Milam*, 157 Pacific Reporter, 941.)

**ASPECT OF CONTRACTS FOR SHIPMENTS TO BELLIGERENT COUNTRIES.**—Unforeseen difficulties confronting one who has contracted to charter a vessel to carry a cargo to a foreign country, in the matter of securing marine insurance and payment for the goods, due to war declared between such country and a third nation after the contract was made, but before the time for loading arrived, do not release the chartering shipper from the contract, and the owner of the vessel is entitled to recover damages flowing from breach of the contract. This decision would not apply, however, if the port to which the cargo was to be carried were blockaded after the contract was entered into. (United States District Court, District of Maryland, *Furness, Withy & Co. vs. Louis Muller & Co.*, 232 Federal Reporter, 186.)

**WHEN SALES CONTRACTS ARE UNENFORCEABLE.**—When there has been no definite agreement upon the identity of goods to be delivered by a seller, there is no agreement which he can legally enforce against the buyer. And when a buyer is given the choice of selecting a given quantity of goods from four certain kinds, the seller is not entitled, on the buyer refusing to make a selection, to make it for him, and then sue to recover the agreed price. Again, when a seller elects to sell goods for the buyer's account, on the latter's refusal to accept delivery, notice of intention to make the resale must first be given the buyer. (Georgia Court of Appeals, *United Roofing Company vs. Albany Mill Supply Company*, 89 Southeastern Reporter, 177.)

**MISTAKE AS EXCUSE FOR BREAKING CONTRACT.**—A steel company's customer telephoned an order for 50 tons of steel bars of specified sizes and lengths, and confirmed the order by letter. The company accepted and proceeded with the cutting, but after 10 tons had been delivered the buyer stated that he had all he needed, and that if more was intended to be shipped there was a mistake in the order, which he asked canceled. This the company refused to do, having cut the material to special lengths to fill the order. In awarding judgment in the company's favor for the full contract price, the New Jersey Supreme Court said: "Having declared the provisions of this contract, and thus induced the plaintiff to perform it according to the terms exhibited in this letter, the defendant cannot thereafter set up as a defense to his breach of it that the letter was written under a mistaken understanding of what the real contract was, or that it contained statements which he had not intended to make." (*Carnegie Steel Company vs. Connelly*, 97 Atlantic Reporter, 774.)

Silicon Steel for Bridges

Silicon steel has been incorporated as a special feature in the trusses of the new Ohio River bridge at Metropolis, Ill., says the *Engineering News*. The silicon in the steel, it is claimed, gives a higher yield point and ultimate tensile strength without sacrificing the reduction of area and elongation. The silicon averages 0.30 to 0.40 per cent in steel containing 0.30 to 0.35 per cent carbon. This steel is used for the top chords, main posts, main diagonals, and end panels of the bottom chords, all other rolled structural material being of medium steel, except the eyebars and piers, which are nickel steel. An increase of strength is claimed to be obtained in the silicon steel without the metal becoming hard or brittle.

The table shows the physical and chemical properties of the steels as made from actual specimens of

German Nitrates from the Air

What Germany is accomplishing in producing nitrates from the air is outlined in an article in the *Frankfurter Zeitung*. Particular reference is made to the extraordinary rapidity with which the Haber process for the synthetic production of ammonia by the union of hydrogen with atmospheric nitrogen has been developed by the Badische Company. The article states that

The production rose from 30,000 tons in 1913 to 60,000 tons in 1914, and by about the middle of last year it was about 150,000 tons. From the present year onward it is reckoned at 300,000 tons, while it is mentioned that the Badische Company has begun to put up further large plants in another part of Germany, so that the capacity for production will shortly be considerably increased.

Assuming that the production will in the near future reach 500,000 tons, the Haber process alone will represent a pro-

Tests of Silicon Steel and Other Steel for the Ohio River Bridge at Metropolis, Ill.

Grade of Steel	Piece	Size, In.	Length, In.	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 8 In., Per Cent	Reduction of Area, Per Cent	Fracture	Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Silicon, Per Cent
Silicon....	Plate ...	42 x 1 1/2	435 1/2	53,870	86,000	18.5	30.8	1/2 cup.....	0.34	0.74	0.016	0.026	0.320
Silicon....	Plate ...	42 x 1 1/2	435 1/2	50,160	81,350	19.7	37.1	1/2 cup.....	0.31	0.68	0.016	0.031	0.350
Silicon....	Plate ...	42 x 1 1/2	608	47,450	86,780	18.5	40.2	1/2 cup.....	0.29	0.70	0.020	0.037	0.400
Silicon....	Plate ...	42 x 1 1/2	703	49,660	83,640	19.7	43.7	Angular	0.30	0.65	0.016	0.034	0.350
Silicon....	Angle ...	8 x 8 x 1 1/2	608	51,400	89,280	19.7	41.9	Silky, 1/2 cup..	0.32	0.62	0.023	0.030	0.300
Silicon....	Angle ...	8 x 8 x 1 1/2	595	48,000	82,640	16.6	31.7	.....	0.35	0.57	0.024	0.040	0.274
Silicon....	Angle ...	8 x 8 x 1 1/2	690	50,720	84,220	19.2	46.3	Silky, ang. ...	0.35	0.52	0.029	0.040	0.300
Medium ...	Plate ...	33 x 3/4	348	38,620	63,400	27.5	57.4	Cup .....	0.22	0.35	0.014	0.028	.....
Medium ...	Plate ...	21 x 1 1/2	110	38,000	62,390	26.7	52.0	1/2 cup.....	0.25	0.54	0.014	0.047	.....
Medium ...	Angle ...	8 x 8 x 1 1/2	390	38,100	60,600	28.5	54.0	Cup .....	0.20	0.50	0.020	0.026	.....
Nickel*...	Eyebar..	12 x 1 1/2	436	57,000	92,640	13.1	40.2	100%, silky cup	0.34	0.60	0.016	0.026	0.060

(in 18 ft.)

\*Note. Full size test of nickel-steel eyebar; elongation in 18 ft.; nickel, 3.27 per cent.

steel furnished by the American Bridge Company. These steels are to be used in the new bridge of the Chicago, Burlington & Quincy Railroad at Kansas City, Mo.

Dreadnaught Tennessee to Be Propelled by Electricity

The United States super-dreadnaught Tennessee, now under construction, is to be equipped for electric propulsion with apparatus built by the Westinghouse Electric & Mfg. Company, East Pittsburgh. Instead of the propellers being mechanically connected to driving engines or steam turbines, two steam turbines developing over 33,000 hp. will drive electric generators which in turn will furnish current for four 6700-hp. motors, each motor coupled to a propeller. By this arrangement the steam turbines may be located in any desired part of the ship and the propelling machinery is thus better protected from injury than otherwise; and full power is available for reversing, besides great rapidity in maneuvering being possible. The contract includes the auxiliaries for the main turbine generator sets and smaller auxiliary turbine generators supplying light and power throughout the ship. Several hundred electric motors will be required and electricity is to be used for cooking, ice-making, refrigerating and other purposes. In all about 37,500 hp. of electricity will be needed, an amount sufficing for a city of about 100,000 inhabitants.

Manganese Ore Imports Increasing

Manganese ore imports into the United States for May, 1916, were 74,825 gross tons, against 48,413 tons in April. The May imports are the largest this year, those for April having been the previous record. The total for the five months of the year is now 174,783 tons, an average of 34,956 tons per month, comparing with 26,731 tons per month in 1915 and 28,757 tons per month in 1913, the record year. For the 11 months ended May 31, 1916, the imports were 430,620 tons against 175,843 tons and 266,245 tons for the corresponding periods in 1915 and 1914 respectively.

duction of nitrogen very nearly equal to the quantity of Chile saltpetre formerly imported by Germany. But in addition, with State aid, large quantities of nitrogen have been produced as of nitrate of lime, and the whole tendency in the coal industry has been toward increasing the development of by-products. Up to the outbreak of war it is stated that about one-fifth of the coal was coked, but the war has brought about a great increase in coking, and the indications are that in the near future the direct combustion of coal will be replaced by by-product processes. Assuming that the quantity of coal used for the recovery of ammonia is only doubled, the increase in sulphate of ammonia production would amount to 450,000 tons.

On the basis of the above statements the following comparison is given between 1913 and 1917:

German Consumption of Nitrogen, 1913		Nitrogen,	
	Tons	Tons	
Sulphate of ammonia.....	460,000	=	92,000
Norwegian nitrate of lime.....	35,000	=	4,500
Nitrate of lime.....	30,000	=	6,000
Ammonia—Haber process.....	20,000	=	4,000
Total .....			106,500
Plus Chile saltpetre.....	750,000	=	116,000
Grand total.....			222,500
German Production of Nitrogen, 1917			
Sulphate of ammonia.....	700,000	=	140,000
Norwegian nitrate of lime.....		=	.....
Nitrate of lime.....	400,000	=	80,000
Ammonia—Haber process.....	500,000	=	100,000
Total .....			320,000

Thus the German domestic production of ammonia next year will be greater than the German consumption in 1913, even if no Chile saltpetre be imported.

The production of bituminous and anthracite coal in the United States in 1915 was 531,619,487 net tons, an increase over 1914 of 18,094,010 tons or 3.5 per cent, according to C. E. Leshner of the U. S. Geological Survey. Of this total, 442,624,426 tons was bituminous coal and lignite and 88,995,061 tons was Pennsylvania anthracite. The coal mines employed 734,008 men an average of 209 days.



ESTABLISHED 1855

# THE IRON AGE

EDITORS:

A. I. FINDLEY

GEO. W. COPE

W. W. MACON

CHARLES S. BAUR, *Advertising Manager*

Published Every Thursday by the DAVID WILLIAMS CO., 239 West Thirty-ninth Street, New York

W. H. Taylor, *Pres. and Treas.*

Charles G. Phillips, *Vice-Pres.*

Fritz J. Frank, *Secretary*

M. C. Robbins, *Gen. Mgr.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: Equitable Building. Philadelphia: Real Estate Trust Building. Cleveland: New England Building. Cincinnati: Mercantile Library Building.

Subscription Price: United States and Mexico, \$5.00 per year; single copy, 20 cents; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year. Entered at the New York Post Office as Second-class Mail Matter.

## Prospective Pig-Iron Capacity

The announcement that the Bethlehem Steel Company's new construction program will involve a total of 12 blast furnaces suggests a fresh estimate of our prospective pig-iron capacity. The number is relatively large, seeing that only five strictly new furnaces have been completed since the end of 1913, while only 14 stacks, apart from the Bethlehem furnaces, are in course of erection or are definitely projected.

It should be premised that there has been a large increase in pig-iron production of late through better operation of the old furnaces rather than through the addition of new stacks. Early in 1913 a production rate of about 30,000,000 tons a year was reached, with substantially all the physically and commercially fit furnaces in blast. It was doubtful if the existing furnaces could maintain such a rate. After production had begun to decline, but still in 1913, four new furnaces were blown in—two of the Pittsburgh Steel Company and one each of the Oriskany Ore & Iron Corporation and the Youngstown Sheet & Tube Company. In 1914 no strictly new furnaces were completed, while in 1915 three new stacks appeared—one of the Pennsylvania Steel Company, No. 5, and two of the Minnesota Steel Company. With these relatively slight additions the pig-iron production closely approached a 40,000,000-ton rate last spring, whereby the average capacity might be estimated at 39,500,000 tons, by the commercially fit furnaces. The above named new stacks completed in the past three years would add only about a million tons, so that there appears to have been an increase in capacity from the spring of 1913 to the spring of 1916 of a million tons from new furnaces and of about 4,500,000 tons from harder driving and rebuilding and improving the old stacks.

To determine our prospective capacity it is convenient to adopt a standard rating, as the new stacks being built vary but little in size and equipment. The great majority of furnaces built in the past ten years now easily average 500 tons a day, and 500 tons a day with six weeks of complete idleness every three years would make an average of 175,000 tons a year per furnace. As furnaces are frequently relined or repaired when commercial conditions would have them idle anyhow, 175,000 tons a year seems to be a conservatively low esti-

mate when the object is to determine the maximum possible output.

The two new stacks recently blown in—River No. 3 at Cleveland on May 13 and Cambria No. 9 at Johnstown on June 5—may conveniently be grouped with the prospective furnaces, as additions to the 39,500,000 tons productive capacity developed last spring. Then there are six independent stacks to arrive, Midvale, River No. 4, Haselton No. 5 of Republic, United at Canton, Ohio, Inland No. 3 and Whitaker-Glessner, also eight stacks at Gary, four of the Indiana Steel Company and four of the National Tube Company, making 14 apart from Bethlehem. The four Bethlehem stacks and the four Maryland stacks are to be entirely new, while the four Steelton are to replace four old Steelton stacks, to which the large No. 5 was added last year. The Steelton construction may be taken as the equivalent of two new stacks, making with the furnaces recently blown in an equivalent total of 26 stacks at 175,000 tons a year, or 4,500,000 tons to be added to 39,500,000 tons, giving a prospective total capacity of 44,000,000 tons. But a small part of this increase will occur this year and it is not certain that all of it will have been attained by the end of next year.

An output of 44,000,000 tons of pig iron in 1918 would not represent nearly as large a proportionate increase in ten years as has occurred in previous ten-year periods. Even assuming 44,000,000 tons for 1917, something which is obviously impossible, the comparison would be with a rate of 27,000,000 tons maintained during the greater part of 1907, ten years earlier, representing an increase of only 63 per cent, whereas through 1907 pig-iron production was doubling quite consistently at an average rate of once every ten years. We certainly expect to make a large part of the world's pig iron in future, and in 1913 the world outside the United States actually produced about 47,000,000 gross tons of pig iron.

Only a very small percentage of the new blast furnace construction is destined to increase the supply of merchant iron, almost all of it being mated with steel works erection. While the iron foundry industry grows much more slowly than the steel making industry, it does grow. Such increase in its requirements as may have occurred since 1913 has doubtless been taken care of by the better performance noted on the part of individual merchant



stacks; but very little definite provision is made by the present new blast furnace program for further increase in the demand for merchant iron.

### Europe's Coming Economic Struggle

What amounts to a boycott of the products of the Central European powers is being seriously considered by the other belligerent governments. The so-called economic conference of the Allies in Paris, on the four days beginning June 14, drew up a set of recommendations which must now receive the approval of the respective governments. The resolutions cover measures to be followed during the war period, measures to hold while reconstruction of Belgium, northern France and Servia is under way, and measures to be enforced for indefinite periods after reconstruction.

The war-period conditions have prevailed for some time. This country has felt their influence in the restriction, for example, that English ferro-manganese will be supplied only on the promise that the steel in which it is used does not reach Great Britain's enemies. The like restrictions as to tin are well known and in the last ten days the British Government has laid its hand on the trade of Americans who are charged with dealing with its enemies. The measures of the reconstruction period aim to prevent dumping from Germany and Austria and

to fix by agreement a period of time during which the commerce of the Enemy Powers shall be submitted to special treatment and the goods originating in their countries shall be subjected either to prohibitions or to a special régime of an effective character. The Allies will determine by agreement through diplomatic channels the special conditions to be imposed during the above mentioned period on the ships of the Enemy Powers.

It is further stipulated that

the Allies will devise the measures to be taken jointly or severally for preventing enemy subjects from exercising, in their territories, certain industries or professions which concern national defense or economic independence.

When it comes to permanent measures, the Allies are to take steps to render themselves independent of the enemy countries as regards raw materials and manufactured articles; to establish low rates for speedy land and water intercommunication and transportation, and to reform the patent laws.

National interest is sure to come to the front as the bearing of each measure is studied. The nearer the end of the war seems to be, the more definite shape will each nation's views assume. In each nation's self-interest will lie the difficulty of a general concert. The conference itself is clearly the expression of a belief that war has entered on its last stage and that it means victory for the Entente Allies. If this proves true, but the cessation of fighting is long delayed, the several governments may then get together on some basis; otherwise they will find themselves at variance with regard to one or more of the recommendations, and international trade will again flow on without this gigantic barrier against Central Europe. In all this the United States is assumed to be a spectator. In discussions of international trade this country has not been and is rarely yet considered in Europe's calculations. In the Allies' plans to check Ger-

many's foreign business, it is not clear how far American interests are injuriously affected. It might be expected that the two belligerent groups would crowd each other and likewise the United States in going after the trade of neutral countries, also that each group would try to unload on the United States as much as possible of the products it had previously marketed in the countries of the other groups. What will actually happen is likely to be quite different from any program, however carefully worked out. The trade currents of generations are not to be turned out of their courses by conclave edicts. Moreover, any scheme based on the idea that one great nation will sell largely to another without at the same time buying largely from it—in other words, putting international trade on any other basis for the long pull than the old-time basis of barter—will break down sooner or later. The Paris conference will doubtless have far-reaching results, but there has been too great a tendency to the view that its resolutions have permanently amended old-fashioned economic laws.

### Contracts for Finished Steel

In the hearings in the dissolution suit against the United States Steel Corporation a great deal of time was spent in cross-examining witnesses who asserted that contracts for the sale of finished steel products were as a rule merely options, to be exercised or not at the pleasure of the buyer. The effort to break down the testimony was unsuccessful and it was established that contracts purporting to control the sale of hundreds of millions of dollars' worth of steel annually were valueless to the ostensible seller in case of a market decline, but were frequently worth many tens of millions of dollars to the buyers, in case of a market advance. To change the so-called contracts from virtual options into real obligations, binding upon both parties, would not necessarily be to the disadvantage of the one party and the corresponding advantage of the other. The essence of such a change would be the change from an utterly unbusinesslike practice to a strictly rational system, and the whole practice of making purchases and sales would be altered, through buyers and sellers alike being moved to a different procedure by the knowledge that the obligation undertaken would have to be carried out or a penalty suffered.

For years this "contract evil" in the finished steel trade has been discussed, its absurdities pointed out and its elimination urged, but until now no direct and formidable effort has been made to improve the situation. It was left for the sheet trade to undertake in a serious way the correction of the evil, though it may be doubted whether the conditions in the sheet trade have been markedly worse than those in several other branches of the finished steel trade. As reported last week in the news columns of THE IRON AGE there was formally organized on July 18 the National Association of Sheet and Tin Plate Manufacturers, comprising, it appears, more than 90 per cent of the independent sheet-producing capacity of the country, and having for its chief though by no means its sole object the correction of the contract evil. A strong resolution

was adopted against the making of contracts with an expressed or implied guarantee against decline in the market price and recommending the adoption by all sheet mills of the contract form recently devised by the contract committee of the American Iron and Steel Institute, or a similar form. The association's committee has since adopted the institute form with inconsequential modifications.

The ordinary contract in the finished steel trade has hitherto not been enforced for three reasons: 1. There was doubt as to its legality, inasmuch as a strict interpretation would show it to lack the mutual feature which is necessary to make a contract legal. 2. No clear method was provided for showing the amount of injury in case of violation. 3. No mill was disposed to attempt to enforce the contract when violations were so general.

The gathering together of the sheet mills and the adoption of the new contract form are expected to remove these difficulties. It is expected that the individual sheet manufacturer will have confidence that all sellers will undertake to enforce their contracts. The contract form itself, passed upon by eminent legal talent, provides liquidating damages for either party, to be determined in the same manner, provided the other party violates the contract. The buyer may fail to specify or the seller may fail to ship, and in either instance the liquidating damages are to be measured by the difference between the contract price and the market price at the time of such failure, with the further proviso that in no event are the damages to be measured by less than 10 per cent of the stated contract price.

There is no occasion to regard the proposed contract form from the viewpoint of what would occur if contracts of the present nature, as to tonnage, time of delivery, etc., were written upon that form. Often, usually indeed, it is a financial or physical impossibility for the one party or the other to carry out the contracts now written. In a falling market it would usually be a financial impossibility for the buyer to take all the material he has contracted for, when he may have contracted for one-half more tonnage than he could use in the most favorable business conditions, while on a rising market it would be physically impossible for the mill to furnish on time all the material it has sold, for as the buyer overbuys so the mill oversells. The adoption of this new contract, therefore, cannot be regarded as representing any effort to make enforceable contracts of the character of those now made. Rather the change in contract form, if effected, would result in a complete change in the obligations undertaken by buyer and seller respectively, as to price, tonnage and period of delivery.

One may expect, therefore, that if the movement succeeds it will result in both buyer and seller undertaking obligations for smaller tonnages than formerly, and presumably for shorter periods of delivery also. Faced with the prospect of liquidating damages in case of a failure to live up to the contract, the buyer will contract for no more steel than he reasonably expects to be able to take to advantage, and the seller will contract to ship no more than he can reasonably expect to be able to make. Being promised liquidating damages if the other party fails to carry out his part, the mill need not oversell, in order to be insured enough

business to run, and the buyer need not overbuy in order to be insured sufficient material with which to conduct his business. Whether market advances would be stimulated and declines retarded, or the reverse, is a question which might admit of considerable discussion, and very probably to no good purpose. The object of those who have undertaken the reform is chiefly to establish businesslike methods in place of utterly unbusinesslike methods, to establish the selling of sheets upon the same basis as obtains in billets, pig iron, spelter and other commodities with which usually they have more or less to do.

The thorough and earnest manner in which the sheet mills have now taken up this subject of reform raises the question whether other branches of the finished steel trade in which the "contract evil" has been a crying one for years will take similar steps. Thus far the other branches have not been heard from, although it is understood that the tin plate manufacturers, without a regular organization, have been very seriously considering the same subject.

## CORRESPONDENCE

### Purchasing Railroad Equipment

*To the Editor:* In October of this year section 10 of the Clayton anti-trust act becomes effective. It provides for the regulation of equipment purchasing by railroads. The rules are to be established by the Interstate Commerce Commission. It will be necessary for the roads to prepare numerous specifications and drawings, as any prospective bidder can demand full information, even though he may have no serious intention of competing for the business. This will cause not only annoyance but considerable expense from which there seems to be no escape.

The commission, however, can help to eliminate much of this expense by including in its rules permission to follow the practice of many municipalities, also of many architects, when large contracts are involved. Prospective bidders are informed that copies of plans and specifications can be obtained upon depositing a specified amount—say \$10 or more. Of course, as far as the railroads are concerned, the deposit in many cases would be much smaller. The practice will serve, however, not only to offset some of the expense which will be saddled on the roads, but limit the bidding to those who are really desirous of obtaining orders.

D. M.

### Foundry Safety and Sanitation

The American Foundrymen's Association committee on safety and sanitation had a meeting at Rochester, N. Y., July 20 and 21, presided over by the chairman, Victor P. Noonan, director of safety of the Industrial Commission of Ohio. The committee prepared a new code which will be presented at the foundry convention at Cleveland in September. It embodies the best features of the various codes that have been prepared by State organizations and is expected to form the basis for State legislative action.

The contract for the new blast furnace to be erected at Coatesville, Pa., for the Worth Brothers Department of the Midvale Steel & Ordnance Company, has been awarded to the W. B. Pollock Company, Youngstown, Ohio. It will make the third blast furnace at that plant and will have a capacity of 500 tons a day.



## A HUGE NAVAL PROGRAM

### Senate Appropriations for 157 Vessels to Cost \$588,000,000

WASHINGTON, D. C., July 25.—The Senate on July 21 passed the largest naval appropriation bill in the history of the country, and in a special resolution gave notice to the House of Representatives that it will insist upon all of the provisions of the measure, thus foreshadowing one of the most notable parliamentary contests of the session. The bill, which passed the Senate by a vote of 71 to 8, appropriates \$315,826,843, or \$45,857,588 more than was authorized by the House. The bill as passed carries the Senate committee's amendment appropriating \$11,000,000 for the construction or purchase of a Government armor factory and, notwithstanding the earnest appeals of some of the most experienced members of the Senate, a proposition to strike out the provision prohibiting scientific shop management in Government establishments inserted by the House was rejected without the formality of a roll call.

#### TO BUILD 157 VESSELS IN THREE YEARS

The building program as provided by the Senate bill contemplates the construction of no less than 157 vessels, including 16 capital fighting ships, within three years, at an estimated cost of \$588,180,576, of which \$110,726,160 will be expended during the first year. The following table presents the House and Senate building programs upon the basis of which the conference committee must work out the final compromise, which it is believed will include the principal features of the Senate bill:

	House	Senate, Three Years	Senate, First Year
Battleships .....	10	10	4
Battle cruisers .....	5	6	4
Scout cruisers .....	4	10	4
Destroyers .....	10	50	20
Fleet submarines .....	—	9	—
Coast submarines .....	50	58	30
Submarine (Neff) .....	—	1	—
Fuel ships .....	1	3	1
Ammunition ships .....	1	2	1
Hospital ships .....	1	1	1
Repair ships .....	—	1	—
Transports .....	—	1	—
Destroyer tenders .....	—	2	—
Submarine tenders .....	—	1	—
Gunboats .....	—	2	1
Totals .....	72	157	66

In addition to the building program and the government armor factory the Senate bill carries \$19,485,500 to provide ammunition for ships to be built in the next two years; \$3,300,000 for batteries for merchant auxiliaries; \$3,500,000 for aviation; \$1,500,000 for the naval experimental and research laboratory, suggested by Mr. Edison; \$1,411,000 for a Government projectile plant; \$10,335,915 for the maintenance and enlargement of naval stations, navy yards and docks; \$50,226,912 for pay of the Navy and \$1,270,000 for arming and equipping the naval militia.

#### BETHLEHEM OFFER REJECTED

The discussion of the Senate Naval committee's amendment providing for a Government armor factory was exceedingly acrimonious, and at times descended to personalities rarely indulged within the dignified precincts of the Senate. Senator Oliver, who led the movement to strike out the Government armor factory provision, laid before the Senate the definite offer of the Bethlehem Steel Company to make for the Government any quantity of armor within the capacity of its plant for an indefinite length of time at any price which might be fixed by the Federal Trade Commission after a careful investigation of the company's books and manufacturing processes. In support of this proposition Senator Oliver emphasized the importance, in the light of the experience of the warring nations of Europe, of maintaining all the private facilities for the manufacture of war material now in existence with a view to enabling the Government to meet any emergency that might arise. Should the Government armor factory be constructed, Senator Oliver said, the plants of the private manufacturers would be rendered useless

and would have to be scrapped, thus depriving the Government of a valuable reserve factor of safety in national defense.

Senator Oliver's amendment, though unopposed by any member of the Senate, was defeated by a vote of 51 to 17, 27 members of the Senate not voting. The Pennsylvania Senator thereupon submitted a substitute for the armor factory provision as follows:

The Federal Trade Commission is hereby directed, immediately after the passage of this act, and annually thereafter, upon the request of the Secretary of the Navy, to investigate and inventory the armor-plate plants of the United States, and to estimate and determine the average full cost of producing armor plate at said plants under the four following conditions, to wit:

- (a) Plants running at full capacity.
- (b) Plants running at two-thirds capacity.
- (c) Plants running at half capacity.
- (d) Plants running at one-third capacity.

After so determining the full cost of producing armor plate at said plants the said Federal Trade Commission shall at once report to the Secretary of Navy a fair and reasonable price the Government should pay for its armor plate. Upon receipt of such report the Secretary of the Navy is hereby authorized to enter into a contract or contracts for armor plate to meet the needs of the Government, now or hereafter, at or below the price per ton so reported as the fair price for the proportion which the tonnage awarded bears to the aggregate capacity of the plants, and the appropriation hereby made for the erection or purchase of an armor-plate plant shall not be used for that purpose until the said report has been made to the Secretary of the Navy and the manufacturers of armor plate have failed, within 30 days after notice of such report, to accept the same and to enter into a contract for the manufacture of said armor plate at or below the price per ton so reported by said commission.

This substitute was lost by a vote of 49 to 16, 30 Senators not voting.

Senator Penrose, of Pennsylvania, subsequently obtained unanimous consent to have printed as a public document a series of propositions addressed to Congress by the Bethlehem Steel Company with reference to the manufacture of armor which have been published from time to time as advertisements in the daily press, but after a sharp attack on the proposal by Senator Reed of Missouri, Senator Penrose declared that he would withdraw his request for the printing of the document in question. But before taking his seat he read to the Senate a long list of Congressmen's speeches, addresses, newspaper articles, etc., attacking the Bethlehem Steel Company and other manufacturers of war material, which from time to time have been printed as public documents at the request of various Senators and Representatives. Incidentally Senator Penrose gave notice that henceforth he will object to the publication as a Congressional document of any such matter.

W. L. C.

#### Non-Recoil Guns for Aeroplanes

Some particulars regarding the non-recoil guns for aeroplanes made by the General Ordnance Company, Derby, Conn., have been obtained from E. W. Strong, of the American Vanadium Company, Pittsburgh. To minimize weight without sacrifice of strength, chrome-vanadium steel is used for the barrels; and to take up the recoil, a supplementary barrel, placed end to end with the main barrel, is provided to discharge a quantity of fine shot toward the rear equal in weight to the projectile shot from the front. A 6-pounder gun complete weighs 103 lb. and has an over-all length of 10 ft. The barrel is 0.47 in. in thickness over the chamber, while near the muzzle the thickness is 0.102 in. A 2-pounder weighs 65 lb., and has a bore of 1.575 in. and a maximum thickness of the barrel of 0.315 in. over the chamber and 0.078 in. near the muzzle.

#### The German Projectile Output

Referring to the manufacture of projectiles, the general manager of the Gelsenkirchen Company, in Germany, in discussing iron and steel conditions in a Vienna journal, stated that besides 150 steel works in Germany, large and small, which were at work on munitions, no fewer than 82 concerns had been organized within a short time for the production of steel shells.



## FEDERAL SHIPPING BOARD

### The Main Feature of the Government Ownership Bill—Agreement Reached

WASHINGTON, D. C., July 25.—As the result of conferences extending over many weeks between the majority leaders of the two houses, an agreement has been reached by which the so-called Administration shipping bill will probably become a law within the next fortnight. There has been so much controversial discussion of the Government ownership feature of this bill that the public appears to have lost sight entirely of the fact that the purchase and operation of merchant vessels under the supervision of an official shipping board created by the measure is really but an incidental and more or less temporary feature of a comprehensive statute, the primary object of which is to extend the authority of the Federal Government over the operations of all vessels in the American merchant marine along lines parallel with those which fix the jurisdiction of the Interstate Commerce Commission over the railroads of the country. That the latter feature of the measure is far more important than the former in its practical effect upon the business of the country does not appear to be adequately understood.

#### THE SHIPPING PURCHASE FEATURE

The United States Shipping Board, created by the pending bill and composed of five commissioners to be appointed by the President—the provision of the original House measure making the Secretaries of the Navy and of Commerce members of the board having been stricken out by the Senate—is authorized within a limit of expenditure of \$50,000,000 "to have constructed and equipped, in American ship yards and navy yards or elsewhere, giving preference, other things being equal, to domestic yards, to purchase, lease, or charter vessels suitable, as far as the commercial requirements of the marine trade of the United States may permit, for use as naval auxiliaries, for army transports, or for other naval or military purposes." The board is forbidden to purchase, lease or charter any vessel engaged in the foreign or domestic commerce of the United States, unless it is about to be withdrawn from such commerce, or which is under the flag of a foreign country then engaged in war or which is not adapted, or cannot by reasonable alterations be adapted, to the purpose specified in the act, or which is not at least 75 per cent as efficient as when originally put in commission.

After acquiring vessels in the manner prescribed the board is authorized "upon terms and conditions prescribed by and approved by the President" to charter, lease or sell to any person, a citizen of the United States, any vessel purchased, constructed or transferred. In the event of its inability to charter, lease or sell the vessels under its control, but not otherwise, the board is authorized to form corporations for the maintenance and operation of such vessels, the Government to purchase and vote not less than a majority of the capital stock of any such corporation. In time of war all the vessels under the control of the shipping board may be taken over and used as naval auxiliaries.

#### SHIPPING REGULATIONS

The features of the shipping bill which provide for the Federal regulation of the American merchant marine are patterned closely upon the Interstate Commerce law, modified in accordance with suggestions obtained by the House Committee on the Merchant Marine and Fisheries during an extended investigation of practices of vessel owners on the Atlantic and Pacific coasts and upon the Great Lakes. Special attention was given by the committee to conditions on the lakes, particularly in the ore-carrying trade, and several important recommendations based upon methods pursued therein and regarded by the committee with disfavor have been incorporated in the bill.

Section 15 of the measure, as perfected by the Senate Committee on Commerce, forbids deferred rebates; prohibits the use of "fighting" ships; forbids retaliation

against the shipper because such shipper has patronized another carrier; and prohibits any unfair or discriminatory contract with any shipper based on volume of freight offered. Under the terms of section 16, every common carrier by water is required to file immediately with the board a true copy of every agreement with another carrier fixing or regulating transportation rates or fares, etc.; and the board is authorized by formal order to disapprove, cancel or modify any such agreement that it finds unjustly discriminatory or unfair as between carriers.

Section 17 forbids any common carrier by water to give any undue or unreasonable preference or advantage to any particular person or locality and forbids any person to obtain transportation for property for less than the regular rates, or to resort to certain unfair methods and devices, or to induce any marine insurance company or underwriter not to give a competing carrier by water as favorable a rate of insurance on vessels and cargo as is granted to the carrier subject to this act. Carriers by water in foreign commerce are prohibited by section 18 from charging or collecting any fare or rate which is unjustly discriminatory between shippers or ports and specifically empowers the board to correct such unjust discrimination. Carriers are also required by this section to establish and observe just and reasonable regulations and practices. Section 19 authorizes the board to set aside a rate or fare found to be unreasonable and to prescribe a reasonable maximum rate or fare and carriers are required to file with the board and to keep open to public inspection all freight and passenger tariffs.

Cut-throat competition is provided against by section 20 of the bill which stipulates that when a carrier by water reduces its rate below a fair and remunerative basis, with the intention to injure a competitor, it shall not increase such rates until the board, after hearing, finds that such increase rests upon changed conditions. A practice found to exist in various parts of the country is prohibited by section 21 of the bill which makes it unlawful for a common carrier by water to disclose to anyone except the consignee or shipper, without their consent, information as to nature, kind, quantity, destination, consignee or routing of any property. Periodical reports of all common carriers by water are required by section 22 of the bill. Other sections of the measure describe in detail the procedure before the board and confer upon the United States courts authority to enforce, suspend or set aside any order of the board.

It is expected that the Senate debate on the measure will occupy not more than four or five days. W. L. C.

### Morse Chain Company Still Growing

The capital stock of the Morse Chain Company, Ithaca, N. Y., has been increased from \$400,000 to \$1,500,000 for expansive purposes in the shape of new buildings and additions to old ones already under way. The remarkable growth of this company is well illustrated by the successive building operations made necessary by the demand for its single product—Morse rocker-joint power transmission. From a fair sized factory at Trumansburg, N. Y., in 1904, about the time when electric motors came into broad commercial use, the business commenced to spurt, and in 1906 was removed to Ithaca to a new factory built specially for the purpose and twice as large as the former one. In 1912 it again became necessary to enlarge and the floor space was more than doubled. Present plans contemplate again doubling the size of the plant. A large storage building is about completed, additions to the steel and wire mills and a new gas producer building are well under way, and another addition to the main building, increasing its total length to more than 900 ft., is soon to be started. When these buildings are completed, the Morse Chain Company will have a total floor space of approximately seven acres, all of which will be devoted exclusively to the manufacture of Morse rocker-joint power transmission.

It is expected that the rebuilt Meily furnace at Lebanon, Pa., will be put in blast in the coming week.

## STEEL CORPORATION EARNINGS

Surplus for June Quarter, \$47,964,535, Making  
Surplus for Half-Year \$80,818,707

The United States Steel Corporation's statement for the quarter ended June 30, issued on Tuesday, shows net earnings of \$81,126,048—a truly stupendous amount, far in excess of any previous quarter. Net earnings for the corresponding period of 1915 were \$27,950,055. The statement is as follows, in comparison with that quarter:

	1916	1915
April .....	\$25,423,676	\$7,286,409
May .....	27,554,899	9,320,576
June .....	28,147,473	11,343,070
Total earnings after deducting all expenses incident to operations, including those for ordinary repairs and maintenance of plants and interest on bonds of the subsidiary companies	81,126,048	27,950,055
Less charges and allowances for depreciation:		
Sinking funds on bonds of subsidiary companies and depreciation and extraordinary replacement funds .....	8,071,848	6,031,013
Sinking funds on U. S. Steel Corporation bonds .....	1,673,978	1,607,458
Net income .....	71,380,222	20,311,584
Deduct interest for the quarter on U. S. Steel Corporation bonds outstanding .....	5,412,962	5,493,884
Premium payable on bonds redeemable under sinking funds .....	261,000	245,136
Balance .....	65,706,260	14,572,564
Deduct dividends for the quarter on stocks of the United States Steel Corporation:		
Preferred, regular, 1% per cent. ....	6,304,919	6,304,919
Common, regular, 1½ per cent. ....	6,353,781	.....
Common, extra, 1 per cent. ....	5,083,025	.....
Surplus for the quarter .....	\$47,964,535	\$8,267,645

It will be observed that the huge earnings of the past quarter have encouraged the directors to begin to reimburse the common stockholders for the lean period through which they were obliged to go without dividends.

## Gronwall-Dixon Electric Furnace Anniversary

A banquet commemorating the first anniversary of the starting of the Gronwall-Dixon electric steel furnace at its plant in Detroit, Mich., was given Saturday night, July 22, at the Detroit Athletic Club by the John A. Crowley Company of Detroit, which controls the United States and Canadian selling rights of this furnace. The pouring of this first heat was the beginning of the electric steel industry in Detroit. During the past year more than 5000 tons of chrome-vanadium, nickel-chrome, nickel and other alloy steels has been made. A new and modern plant is being completed there which will house several furnaces, including 10-ton units, giving a yearly output of 30,000 tons of steel.

At the banquet Mr. Crowley said that the selection of Detroit as the location for the proposed steel plant was because it is the center of the greatest alloy and high grade steel consuming district in the world. He announced the sale of two Gronwall-Dixon furnaces, which will be installed shortly. One of these furnaces will be used for sheet bars, and the second for high grade tool steel.

## Ferrovanadium Exports Very Large

Ferrovanadium exports are mounting, those for May being 205,760 lb., the greatest ever recorded. This brings the total to June 1, 1916, to 506,243 lb. or 101,248 lb. per month. For the 11 months ended May 31, 1916, they were 978,031 lb. against 663,238 lb. and 575,231 lb. for the same periods in 1915 and 1914 respectively.

The United Steel Company, Canton, Ohio, has placed in operation two additional 80-ton open-hearth furnaces in its plant B and plans to start up two more furnaces about Aug. 1, making six of its ten new furnaces in operation.

## CONTENTS

Pacific Coast Steel Company's Plants .....	175
Heavy-Duty Single-Pulley Drive Lathes .....	179
New Device to Premelt Ferroalloys .....	179
Detecting Alumina Inclusions in Steel .....	180
Acid Resisting Alloys .....	182
Two-Speed Alternating-Current Elevator Motor .....	183
Push-Button Controlled Polishing Lathe .....	183
The Oxygen Content of Iron and Steel .....	184
Non-Corrosive Alloy for Valves and Fittings .....	186
Cooled Drinking Water for Shops .....	187
Razing a Village for Manganiferous Ore .....	187
Machines for Routing Powder Grooves .....	188
Book Reviews .....	189
Making Flanged Shapes .....	190
Kerosene as a Substitute for Gasoline .....	190
Important Customs Decision .....	191
Death of Charles Kirchhoff .....	192
Republic Semi-Annual Report .....	193
Judicial Decisions .....	194
Silicon Steel for Bridges .....	195
Dreadnaught Tennessee to Be Propelled by Electricity ..	195
Manganese Ore Imports Increasing .....	195
German Nitrates from the Air .....	195
Prospective Pig Iron Capacity .....	196
Europe's Coming Economic Struggle .....	197
Contracts for Finished Steel .....	197
Correspondence .....	198
Foundry Safety and Sanitation .....	198
A Huge Naval Program .....	199
Non-Recoil Guns for Aeroplanes .....	199
The German Projectile Output .....	199
Federal Shipping Board .....	200
Morse Chain Company Still Growing .....	200
Steel Corporation Earnings .....	201
Gronwall-Dixon Electric Furnace Anniversary .....	201
Ferrovanadium Exports Very Large .....	201
Iron and Steel Markets .....	202
Iron and Industrial Stocks .....	211
Domestic Ferromanganese Situation .....	211
Finished Iron and Steel Prices, Pittsburgh .....	212
Metal Markets .....	213
German Pig-Iron Output for May .....	213
Obituary .....	214
A Safety Feature of the McDonald Mills .....	214
Page Company to Make Copper Clad Wire .....	214
Copper Tax Eliminated .....	214
Manganese Ore from the Crimora Mine .....	214
Personal .....	215
Strikes and Settlements .....	216
Western Puddlers' Scale Settled .....	216
Pittsburgh and Nearby Districts .....	217
A Modern Malleable Foundry .....	217
Locomotive Orders .....	217
Machinery Markets and News of the Works .....	218
New Trade Publications .....	226



# Iron and Steel Markets

## STEEL FOR LARGE SHELLS

### Deliveries Run to April Next Year

#### Heat Further Reduces Steel Mill Output—Foundry Pig Iron Weaker

Surpassing the highest estimates, the Steel Corporation's \$81,000,000 earnings in the past quarter, reported on Tuesday, following two remarkable statements of independent steel companies, confirm what the market has lately shown of the exceptional position of the producers of steel. Along with heavy tonnages of unfilled orders, and the large purchases Europe is yet to make in this country, they point to a stronger market in the remainder of the year than was indicated one or two months ago.

The week has brought a new crop of rumors of large shell orders. What is confirmed is that over 1,000,000 shells of 8-in. and 9.2-in. sizes have been actually placed for deliveries running up to April 1, 1917. Negotiations for 6-in. to 12-in. shells in quantities representing heavy steel tonnages are still under way, and steel makers look for the placing of more orders soon. The slackening in 3-in. shell business here and the larger British and French output are well known, but in heavy shells this country's capacity will be called upon for a good many months.

To the firmer stand of the steel companies on contract enforcement and the large percentage of orders existing in the form of specifications has been credited the recent caution of domestic buyers as to far forward deliveries. But the new developments in export demand are now the basis for predictions of a September buying movement.

Implement makers' buying of bars for the first half of 1917, reported at 2.35c., Pittsburgh, two weeks ago, has brought out the fact that some mills have thus far made no bar sales for that delivery at less than 2.50c. Implement makers, on the one hand, emphasize the reduced buying of their products which advances have always caused, while bar manufacturers find signs that prices for rolled steel will again be made by the consumer in the way that was seen early this year.

The extent to which foreign demand is now making the market is indicated by the fact that out of 170,000 tons booked in the past week by one Chicago interest, less than 12 per cent was for domestic delivery.

The heat continues to cause an unusual curtailment of output throughout the country—a factor on which more stress is being laid. In the Pittsburgh district the reduction last week is put at 15 to 20 per cent.

Semi-finished steel is more difficult to get for early delivery, after some irregularity in price in June and early July. A sale of 4000 tons of open-hearth billets was made at \$45, Pittsburgh, and for Bessemer billets \$42 is reported, as against \$40 recently. Ohio sheet mill's are sounding the market

for fourth quarter sheet bars, and \$42.50 for Bessemer and \$45 for open-hearth are tentatively named.

Plate prices for delivery in 1917 show an advancing tendency and 3c., Pittsburgh, is now more common for second quarter delivery. Seaboard shipyards will have little capacity available for more than a year. Two additional vessels for the Chilean ore trade have just been placed by the Bethlehem Steel Company at its Sparrows Point yard, making five building for that service.

An inquiry has come up in southern Ohio for 24,000 tons of steel rounds for delivery in the next four months to a company having a British contract for large shells.

One of the expected readjustments due to spelter was announced this week in a \$10 reduction in galvanized iron and steel pipe. The galvanized wire trade remains to be heard from. In sheets the spelter decline was quickly reflected, and that market is even now making some slight response to the recovery of spelter from the low point.

The foundry pig-iron market is affected by the smaller output of foundries, particularly in the Chicago and Central Western districts. Many absentee molders are reported because of hot weather. Foundries are holding up shipments of pig iron, in consequence, and some have offered iron on the market. Some weakness has resulted, notably at Chicago, Detroit and in northern and southern Ohio.

In the Pittsburgh and Valley districts three furnaces have gone out and buying of basic iron for one or two steel companies is expected. There is still export inquiry for 30,000 to 40,000 tons of Bessemer iron and Japan wants 3000 tons additional of low phosphorus.

Ferromanganese is decidedly easier and there is also the possibility of the leading domestic producer figuring again as a seller.

## Pittsburgh

PITTSBURGH, PA., July 25, 1916.

Export demand continues heavy for Bessemer and open-hearth billets and sheet bars, shell steel, wire products, beams, channels, iron car axles and other commodities. This demand is greater for Bessemer and open-hearth steel than can be supplied, and has served to further tighten up the local steel market, semi-finished steel being scarcer and bringing higher prices now than several months ago. The foreign inquiry for Bessemer pig iron has fallen off, but there are yet 30,000 to 40,000 tons of Bessemer iron, mostly for Italy, to ship on orders taken some time ago. The very hot weather has cut down the output of everything 20 per cent or more, and this is being severely felt. There is still belief that early in September there will be a home buying movement, as many domestic consumers have not covered their needs for last quarter and first quarter. The reduction of \$10 per ton on galvanized iron and steel pipe is the only notable change in prices during the week. Galvanized sheets are reported a little firmer with some mills, due to the higher prices of spelter the last few days. The scrap market is again dull, and prices are soft. Coke output is a good deal heavier, but there is still a shortage of labor, and prompt furnace coke is bringing high prices. Conditions are not likely to change much the next month



# A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

	July 26, 1916.	July 19, 1916.	June 28, 1916.	July 28, 1915.
<b>Iron, Per Gross Ton:</b>				
X, Philadelphia...	\$19.75	\$19.75	\$19.75	\$14.50
Valley furnace...	18.25	18.25	18.25	12.75
Southern, Cin'ti...	16.90	16.90	16.90	12.90
Birmingham, Ala.	14.00	14.00	14.00	10.00
Furnace, Chicago*	19.00	19.00	19.00	13.00
deld. eastern Pa.	19.00	19.00	19.50	14.00
Valley furnace...	18.00	18.00	18.00	13.00
Bessemer, Pittsburgh	21.95	21.95	21.95	15.20
Malleable Bess., Ch'go.	19.50	19.50	19.50	13.00
Forge, Pittsburgh...	18.70	18.70	18.70	13.45
Charcoal, Chicago...	19.75	19.75	19.75	15.75
<b>Steel, etc., Per Gross Ton:</b>				
Billets, Pittsburgh.	42.00	40.00	42.00	22.00
Sheet bars, P'gh...	45.00	42.00	42.00	22.00
Forging billets, base, P'gh	69.00	69.00	69.00	28.00
Sheet bars, Phila...	45.00	45.00	50.00	30.00
Wire rods, Pittsburgh...	55.00	55.00	50.00	26.00

<b>Shed Iron and Steel,</b>				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron rails, heavy, at mill	1.47 1/2	1.47 1/2	1.47 1/2	1.25
Iron rails, heavy, at mill	1.56 1/2	1.56 1/2	1.56 1/2	1.34
Sheet bars, Philadelphia...	2.659	2.659	2.659	1.30
Sheet bars, Pittsburgh...	2.50	2.50	2.50	1.25
Sheet bars, Chicago...	2.35	2.35	2.35	1.20
Sheet bars, Pittsburgh...	2.50	2.50	2.75	1.25
Sheet bars, New York...	2.669	2.669	2.919	1.469
Sheet plates, Pittsburgh...	3.50	3.50	3.25	1.25
Sheet plates, New York...	3.669	3.669	3.419	1.369
Angles, etc., Pittsburgh...	2.50	2.50	2.50	1.25
Angles, etc., New York...	2.669	2.669	2.669	1.419
Sheep, grooved steel, P'gh	2.35	2.35	2.35	1.25
Sheep, sheared steel, P'gh	2.45	2.45	2.45	1.30
Steel hoops, Pittsburgh...	2.75	2.75	2.75	1.30

The average switching charge for delivery to foundries in Chicago district is 50c. per ton.

	July 26, 1916.	July 19, 1916.	June 28, 1916.	July 28, 1915.
<b>Sheets, Nails and Wire,</b>				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.75
Galv. sheets, No. 28, P'gh	4.25	4.25	4.60	4.00
Wire nails, Pittsburgh...	2.50	2.50	2.50	1.60
Cut nails, Pittsburgh...	2.60	2.60	2.60	1.60
Fence wire, base, P'gh...	2.45	2.45	2.45	1.40
Barb wire, galv., P'gh...	3.35	3.35	3.35	2.50

<b>Old Material, Per Gross Ton:</b>				
Iron rails, Chicago...	18.50	18.50	18.00	12.25
Iron rails, Philadelphia...	20.00	20.00	20.00	15.50
Carwheels, Chicago...	12.00	12.00	12.00	11.50
Carwheels, Philadelphia...	15.50	15.00	16.00	12.50
Heavy steel scrap, P'gh...	16.25	16.50	15.75	13.00
Heavy steel scrap, Phila...	15.00	15.00	14.75	12.50
Heavy steel scrap, Ch'go.	15.25	14.00	14.00	11.25
No. 1 cast, Pittsburgh...	15.00	15.75	15.75	12.25
No. 1 cast, Philadelphia...	16.00	16.00	16.00	12.50
No. 1 cast, Ch'go (net ton)	11.50	11.50	11.50	9.50

<b>Coke, Connellsville, Per Net Ton a. Green:</b>				
Furnace coke, prompt...	\$2.75	\$2.75	\$2.40	\$1.60
Furnace coke, future...	2.50	2.50	2.50	1.75
Foundry coke, prompt...	3.25	3.25	3.25	2.00
Foundry coke, future...	3.50	3.50	3.50	2.25

<b>Metals,</b>				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	25.25	25.25	27.75	22.00
Electrolytic copper, N. Y.	25.00	25.00	26.50	18.50
Spelter, St. Louis...	10.25	9.00	11.50	18.00
Spelter, New York...	10.50	9.25	11.75	18.25
Lead, St. Louis...	6.00	6.10	6.65	5.45
Lead, New York...	6.20	6.25	6.80	5.50
Tin, New York...	38.00	37.25	39.00	36.00
Antimony, Asiatic, N. Y.	13.50	14.00	17.50	35.50
Tin plate, 100-lb. box, P'gh	\$6.00	\$6.00	\$6.00	\$3.10

...weeks, but the last three or four months of this are expected to be very active.

**Iron.**—The local market is dull and foreign inquiry for Bessemer iron has also quieted down. One furnace of the Jones & Laughlin Steel Company out of blast a few days ago for relining and repairs. It is expected that one or two of the large steel companies may come into the market within a short time for round lots of basic iron, and also possibly for Bessemer. It is stated that the molders' strike in the district, which has been on since December, may be ended within a few days, and if this occurs a better demand for foundry iron may result. Prices are ruling as follows: We quote Bessemer iron at \$21; basic, \$18; gray, \$17.75 to \$18; malleable Bessemer, \$18.50 to \$19; No. 2 foundry, \$18.25 to \$18.50, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per gross ton.

**Ferroalloys.**—All grades are quiet, with prices on manganese easier than for some time. Consumers are well covered and there is but little inquiry. Domestic 80 per cent for prompt shipment is offered at \$175 or less, and on contracts for the remainder of the year at about \$175 at furnace. Spiegeleisen, 18 to 22 per cent, is quoted at \$45 to \$50, and 25 to 30 per cent, \$60 to \$70, at furnace. We quote 50 per cent silicon at \$85 in lots up to 100 tons; over 100 tons up to 600 tons, \$84, and over 600 tons, \$83, all per ton, f.o.b. Pittsburgh. We quote Bessemer ferroalloys as follows: 9 per cent, \$30; 10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50, and 16 per cent, \$40. Seven per cent silvery is \$28.50; 8 per cent, \$29; 9 per cent, \$29.50; 10 per cent, \$30; 11 per cent, \$31; 12 per cent, \$32. These prices are f.o.b. at furnace, or New Straitsville, Ohio, or Ashland, Ky., all with a freight rate of \$2 per gross ton to Pittsburgh.

**Billets and Sheet Bars.**—There is still a very heavy demand for soft Bessemer and open-hearth steel in various forms, running much beyond the capacity of the mills to supply as promptly as wanted. This has driven prices firmer. We note sales of about 4000 tons of 4-in. open-hearth billets for export at \$45 per ton, at Pittsburgh, and 2000 to 2500 tons of sheet bars at

\$43 to \$44.50 at mill. One large domestic maker of steel is running short and is in the market for a round lot. It is doubtful whether any open-hearth steel could be found at less than \$45 at mill, but Bessemer could be had at \$42 to \$43. We quote soft open-hearth billets and sheet bars at \$42 to \$45; Bessemer billets, \$42 to \$43, and Bessemer sheet bars, \$42 to \$43, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at \$69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

**Plates.**—The situation in plates is steadily getting tighter, and, with prospects of very heavy business being placed by the Government for the boats it has decided to build, it would not be surprising if prices of plates in the last three or four months of the year should be higher than they are now. While one or two mills still quote 2.75c. on 1/4-in. and heavier sheared plates for delivery in about the second quarter of next year, most mills are quoting 2.90c. to 3c., and for prompt plates, for shipment in two to three months, mills report there is no trouble in getting 3.50c. to 4c. at mill. Inquiries for cars are very light, the only important one in the market being from the Lehigh Valley Railroad for 1500 box cars. We quote 1/4-in. and heavier plates for deferred delivery at 2.90c. to 3c., and for shipment in two to three months, from 3.50c. to 4c. at mill.

**Structural Material.**—The new inquiry is quite heavy, but local fabricators are not bidding on much new work, being filled up for four or five months. The American Bridge Company has taken 1800 tons for a power house at Dayton, Ohio, and 200 tons for the Amherst College library. The Massillon Bridge & Structural Company has taken 200 tons for a new steel building for the Elyria Steel & Iron Company, Elyria, Ohio. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill, for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

**Steel Rails.**—Only a few scattering orders for small lots of standard sections are being placed. The Car-

**negie Steel Company** is filled up on heavy rails into the third quarter of 1917. Most of the new business in light rails is said to be going to the rerolling rail mills, which are naming lower prices on light rails made from old rails than are asked for light rails made from billets. We quote 25 to 45 lb. sections at \$47; 16 and 20 lb., \$48; 12 and 14 lb., \$49; and 8 and 10 lb., \$50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open-hearth, 1.56½c., Pittsburgh.

**Sheets.**—The advance in spelter in the last few days has firmed up prices a little on galvanized sheets. The demand for electrical sheets is still heavy, also for light and heavy gages of blue annealed, but for Bessemer black and galvanized sheets is only fair. Specifications against contracts are somewhat irregular, one day being light and the next day good. It is said that one or two mills, owing to the advance in spelter, have withdrawn the 4.25c. price on galvanized sheets and are quoting higher. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.25c. to 4.35c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c.; and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

**Tin Plate.**—The plant of the Union Sheet & Tin Plate Company, Marietta, Ohio, is to be started shortly, a supply of tin bars having been secured. The domestic demand for tin plate is rather heavy, but foreign inquiry is light, the few inquiries in the market coming mostly from Russia. The McKeesport Tin Plate Company has started five more mills, and it is said their output is sold for the remainder of this year. The output of tin plate fell off a good deal in the last two weeks, due to the very hot weather. One large company states that on the average it is not getting out more than about 70 per cent of its normal output. We quote wasters from stock at \$5.75 to \$6, and primes at \$6 to \$6.25 to the domestic trade, while for export, \$6.25 per base box, and higher, is quoted. We quote 8-lb. coated ternes at \$8.50 to \$8.75 for 200 lb., and \$8.75 to \$9 for 214 lb., all f.o.b. Pittsburgh.

**Skelp.**—New demand is very dull, with prices steady. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

**Cold-Rolled Strip Steel.**—Nearly all consumers are covered for the remainder of the year and new buying is light. Specifications against contracts are active. Most makers have their output sold up for the next five or six months. On contracts we quote cold-rolled strip steel at \$6 per 100 lb., base, and on small lots, for fairly prompt delivery, from \$6.50 to \$7. Extras, standard with all the mills, were printed on page 810 of THE IRON AGE of March 30.

**Wire Rods.**—New inquiry is quite good and consumers are specifying freely against contracts. The declared value of rods being shipped into Canada has been \$55 for some time, and this is said to be minimum of the market. We quote soft Bessemer, open-hearth and chain rods at \$55 to \$60 per ton, f.o.b. Pittsburgh.

**Wire Products.**—The wire trade is quiet and specifications against contracts are light. Manufacturers look for a heavy fall trade and are accumulating large stocks to meet it. As yet no changes have been made in prices on galvanized wire products, but buyers are holding off in the belief that prices may be adjusted to a lower basis. Regular prices are as follows: Wire nails, \$2.50 to \$2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$2.65 per 100 lb. and annealed fence wire \$2.45; galvanized wire, \$3.15; galvanized barb wire and fence staples, \$3.35; painted barb wire, \$2.65; polished fence staples, \$2.65; cement-coated nails, \$2.50, base, all f.o.b. Pitts-

burgh, with freight added to point of delivery, 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

**Railroad Spikes.**—New inquiry is still light. Seaboard Air Line has placed 5000 to 8000 kegs for delivery over the remainder of the year, and the West Maryland 2250 kegs. Local makers are bidding on inquiry from Russia for 50,000 kegs of dog-eared spikes and it is expected part of the order will be placed here. Regular prices, which are only fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, \$2.75; railroad spikes, ½ and 7/16 in., \$2.75 base; railroad spikes, ¾ in. and 5/16 in., \$3.05 base; boat spikes, ¾ in. base, all per 100 lb., f.o.b. Pittsburgh.

**Nuts and Bolts.**—New demand is not heavy, as consumers are covered for the remainder of the year. Specifications are fairly active. The supply of steel is better than for a long time. Discounts in effect in May 19 are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h. p. nuts, small, rolled thread, 50, 10 per cent; small, cut thread, 50 and 5; large, 40 and 10 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5. Blank bolts, 40 and 10 per cent; ends with h. p. nuts, 40 and 10; with c. p. nuts, 35 and 10. Rough stud bolts, 15. Lag screws (cone or gimlet points) and 10.

Forged set screws and tap bolts, 10 per cent. Cast round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or flister cap screws, 30.

Nuts, h. p. sq., tapped or blank, \$2.90 off list; hex., 10 off; c. p. c. and t. sq. tapped or blank, \$2.60 off; hex., 10 semi-finished hex., 60 and 10 per cent; finished and hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

**Iron and Steel Bars.**—Heavy inquiries for rounds for foreign delivery, mostly from Russia, coming into the market nearly every day, but local mills are filled up so far ahead that, as a rule, they do not quote. The reported sales of steel bars for the first half of 1917 have unsettled the local market to some extent for next year, other consumers insisting that 2.35c. has been done for the implement makers and should have the same price. The new demand for steel bars is heavy, and specifications are active. The general price on steel bars is 2.50c. for such delivery as the mills can make, which probably would not be the first quarter of 1917, while from warehouse stock lots for prompt shipment bring 3c. to 3.25c. In the bar mills being erected by the Carnegie Steel Company at McDonald, Ohio, one large mill will be devoted entirely to the rolling of reinforced steel bars for construction work. We quote refined iron bars at 2.50c. to 2.60c. and railroad test bars at 2.70c. to 2.80c. at mill.

**Shafting.**—New demand is not heavy. Consumers are covered over the remainder of the year and specifications against contracts are not so active as were some time ago. Prices are firm. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

**Cotton Ties.**—Practically all the business in cotton ties for this year has been placed, but a few scattered orders are expected to come in in August and September. We quote cotton ties at \$1.35 per bundle of 40, f.o.b. Pittsburgh, for July shipment.

**Merchant Steel.**—New orders are mostly for small lots, as consumers are covered over the remainder of the year. Specifications are active. Prices on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.50c., base; under ½ x 1½ in., 2.60c.; iron-finished tire, 2.70c.; channel tire, ¾ to ¾ and 1 in., 2.70c. to 2.95c.; 1½ in. and larger, 3.25c.; toe calk, 2.95c.



5c., base; flat sleigh shoe, 2.70c.; concave and convex, 5c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; ring steel, 2.95c. to 3.05c.; machinery steel, smooth sh, 2.75c.

**Hoops and Bands.**—Current demand is light, as consumers are covered for five to six months. Mills report specifications active, and shipments are heavy. Quote steel hoops at 2.75c. and bands at 2.50c., el-bar card extras applying on the latter.

**Rivets.**—The new demand is not heavy, most consumers being covered over the remainder of the year. The foreign demand has fallen off. Prices with makers are firm, but some jobbers who have stocks bought at lower prices were offering them at less than makers' prices, which are as follows: Buttonhead structural rivets, 1/2 in. in diameter and larger, at \$4 per 100 lb., base, and conehead boiler rivets, same sizes, 10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 10 days net, or one-half of 1 per cent for cash in 10 days.

**Wrought Pipe.**—Reports that 100 miles or more of pipe had lately been placed with local mills are confirmed, but a recent order for 45 to 50 miles of 20-in. pipe has been so placed. On 2-in. to 8-in. lap joint pipe, mills are filled up for four or five months. On o. d. pipe three to four months. On butt weld pipe, mills can ship promptly. Effective Monday, July 17, discounts on galvanized iron and steel pipe were increased five points, equal to a reduction of \$10 per 100 lb. The discounts on black and galvanized iron and steel pipe are given on another page.

**Boiler Tubes.**—On locomotive and merchant tubes makers are filled up six to eight months, and are much short in deliveries. Consumers are specifying heavily and premiums are being paid for prompt shipments. Reports are strong on iron and steel boiler tubes, as given on another page.

**Old Material.**—The market has settled down to a condition of lethargy, there being no new inquiry. Consumers are not interested, even at the low prices ruling. Borings and turnings are dull and lower. A tight embargo is on to the plant of the principal consumer located at Brackenridge, Pa. Dealers are not willing to force sales under present conditions. Prices quoted by dealers for delivery in Pittsburgh and nearby districts that take the same rates of freight, per gross are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered .....	\$16.25 to \$16.50
No. 1 foundry cast .....	15.00 to 15.25
Rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa. ....	16.25 to 16.50
Hydraulic compressed sheet scrap....	13.50 to 13.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district .....	11.25 to 11.50
Bundled sheet stamping scrap.....	10.75 to 11.00
No. 1 railroad malleable stock.....	14.75 to 15.00
Railroad grate bars .....	9.00 to 9.25
Low phosphorus melting stock.....	19.50 to 20.00
Iron car axles .....	27.00 to 27.50
Steel car axles .....	27.00 to 27.50
Locomotive axles, steel .....	28.00 to 28.50
No. 1 bushing scrap .....	13.00 to 13.25
Machine-shop turnings .....	8.00 to 8.25
Old carwheels .....	13.00 to 13.25
Cast-iron borings .....	8.00 to 8.25
Sheet bar crop ends.....	17.25 to 17.50
No. 1 railroad wrought scrap.....	18.25 to 18.50
Heavy steel axle turnings .....	11.00 to 11.25
Heavy breakable cast scrap .....	12.50 to 12.75

Shipping point.

**Coke.**—A shortage in supply of prompt blast furnace coke still exists, best grades bringing \$1.75 per ton at oven, while some makes can be had as low as \$1.50. No inquiry is reported for contract furnace coke, furnaces being covered for this year. The Youngstown Sheet & Tube Company is now receiving shipments of coal for its new Koppers by-product gas plant at East Youngstown, Ohio, but the plant is not likely to be started for some little time. We quote blast furnace coke for prompt shipment at \$2.50 per net ton at oven, depending on quality, on contracts over the remainder of the year, from \$2.50 to \$2.50. Several makers that got \$2.65 for their coke on contracts report they are sold up and have no more to offer. We quote best grades of 72-hr.

foundry coke at \$3 to \$3.25 per net ton at oven, and on contracts \$3.25 to \$3.50. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended July 15 as 418,016 net tons, an increase over the previous week of 58,486 tons.

## Chicago

CHICAGO, ILL., July 25, 1916.

New business of local origin is still of very little consequence, negotiations of larger importance in which Western manufacturers are interested being almost entirely connected with inquiry from abroad or overflow business normally placed in other territories. A large amount of inquiry for billet and bar steel, for first quarter delivery to the Allies, is under consideration, as well as large quantities of ship plates for Japan. Of nearly 170,000 tons of orders taken last week by one interest, less than 12 per cent is ultimately for domestic delivery. The plate situation presents an increasingly wide spread between the prices and deliveries of wide and heavy plates and those that are more commonly rolled. For the former, 4c., Pittsburgh, has been done for delivery as protracted as 90 days, while narrow plates have been taken at 3.25c. for shipment in two weeks. The future attitude of domestic buyers of finished steel is still an enigma. Against the possibility of a pronounced buying movement in the fall to cover first half requirements, or an allotment of tonnage such as the mills made to their customers for last half, is the growing disposition of buyers to commit themselves at the present high prices only for what they need in the immediate future, an attitude fostered by the disposition of many mills to hold consumers to a stricter accountability on contracts. In the pig-iron market prices of Northern iron are being maintained in the face of a discouraging situation. Melter who have had their operations curtailed by labor difficulties are not only holding back shipments from the furnaces, but are themselves offering iron for resale. For Southern iron the price is largely determined by offerings of resale iron. The strike of miners at the southern Illinois fluorspar mines is becoming a serious menace. The scrap market was helped somewhat last week by another sale of steel scrap to a local melter at an advance of 75c. per ton.

**Pig Iron.**—Inquiry is not improving. A lot of 2000 tons of malleable iron for delivery at the Indianapolis plant of a manufacturer of conveying machinery is the most important new business up for consideration. Other inquiries of 200 and 500 tons are noted, but most of the prospects are limited to even smaller lots. Local furnaces are maintaining their prices despite the long-continued dearth of new business, and in addition are confronted with resale offerings of iron from foundries whose consumption has been curtailed because of labor troubles. Prices are supported, however, by the patent fact that buying is restricted for other reasons than that of price. Southern furnaces are taking practically no business, the small lots of iron that are being bought being absorbed by offerings of resale iron, which is quoted at prices ranging from \$13 to \$13.50, while the minimum furnace price appears to be \$14, Birmingham. The demand for iron for export is still absorbing attention, and sales of foundry iron from the South and of Bessemer iron are noted. Prices for low phosphorus iron, Ohio silvery and ferrosilicon are easier. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$19.75
Lake Superior charcoal, No. 1.....	20.25
Lake Superior charcoal, No. 6 and Scotch....	20.75
Northern coke foundry, No. 1.....	19.50
Northern coke foundry, No. 2.....	19.00
Northern coke foundry, No. 3.....	18.50
Southern coke, No. 1 f'dry and 1 soft.....	\$18.50 to 19.00
Southern coke, No. 2 f'dry and 2 soft.....	18.00 to 18.50
Malleable Bessemer.....	19.50
Basic .....	19.00 to 19.50
Low phosphorus .....	34.00
Silvery, 8 per cent.....	29.50
Bessemer ferrosilicon, 10 per cent.....	32.50

**Rails and Track Supplies.**—The inquiry from the Canadian Pacific Railway for 25,000 tons of rails is the only large item on which quotations are now outstanding. There is some buying of tie-plates, but in general railroad purchasing is at a standstill. Railroad spikes are still being offered by a Pittsburgh mill on the basis of 2.65c. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, \$33, base; open-hearth, \$35; light rails, 25 to 45 lb., \$40; 16 to 20 lb., \$41; 12 lb., \$42; 8 lb., \$43; angle bars, 2c., Chicago.

**Structural Material.**—It is the understanding that the construction of the factory for James S. Kirk & Co., which was originally figured in structural steel, will now be carried out in reinforced concrete. The fabrication of steel for the new plant of the Mark Mfg. Company, involving about 2500 tons, will be done, it is understood, by the Morava Construction Company. Other structural lettings were of less importance. The American Bridge Company took 720 tons for a sugar factory at Mason City, Iowa, and Christopher & Simpson 300 tons for the Monsanto Chemical Works, St. Louis. The Utah Copper Company at Arthur, Utah, and the Anaconda Copper Mining Company at Butte, Mont., placed orders, involving about 130 tons each, with a Kansas City fabricator. Car builders are figuring on a few new inquiries, one for 1000 cars for the Western Pacific. The Minneapolis & St. Louis is reported in the market for 1000 box cars, and the Chicago & Northwestern has increased its mine car inquiry from 200 to 400. We quote for Chicago delivery of structural steel from mill 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

**Plates.**—Quotations on plates are in sharp contrast, depending upon the sizes of plates desired. Ship plates and wide and heavy plates for other purposes are commanding premiums for protracted deliveries to a greater extent than has heretofore obtained, while narrow plates, such as can be rolled by the average mill, are to be had much more promptly. On a lot of 800 tons 4c., Pittsburgh, was quoted and the order placed for delivery in 90 days. Another lot of 200 tons, sold at 3.25c., Pittsburgh is to be delivered in two weeks. Inquiry for 4000 to 5000 tons of ship plates for Japan is reported. We quote for Chicago delivery of plates from mill, 3.439c. to 3.689c., for prompt shipment, and 3.089c. for delivery at mill convenience.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

**Sheets.**—The rapid decline in the price of galvanized sheets is being checked by the upturn in spelter prices. The firmer attitude of the sheet mills in the matter of the observance of contracts, and their refusal to guarantee prices against decline, may be tested under present conditions, with a number of contracts at 5c. still to be worked out. With respect to blue annealed and black sheets the market is about as last quoted. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.439c. to 4.589c.

We quote for Chicago delivery of sheets out of stock minimum prices applying on bundles of 25 or more, as follows: No. 16 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5c. to 5.10c.

**Bars.**—Inquiry for ammunition bars in large sizes, for 1917 delivery, now before the mills, embraces a large and increasing tonnage. It represents practically the only activity in open-hearth bars. For reinforcing bars there is demand from a number of directions, a considerable part of which will be satisfied with Bessemer, discard, or rail-carbon steel. The appearance of weakness in the rail-carbon situation which has been commented upon seems not to have developed farther, and business more recently placed has been closed very generally on the basis of 2.50c., Pittsburgh. Bar-iron buying is light, but the price is firm. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.689c. to 2.939c.; hard steel bars, 2.50c;

shafting, in carloads, 25 per cent off; less than carload 20 per cent off.

We quote store prices for Chicago delivery: Soft bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. with 5c. extra for twisting in sizes  $\frac{1}{2}$  in. and over and card extras for smaller sizes; shafting 10 per cent off.

**Rivets and Bolts.**—While the prompt shipment business in rivets and in bolts and nuts continues unsettled as to price, with a variable range of quotations, contract negotiations develop a firm attitude on the part of the mills. Orders are neither plentiful nor large. We quote carriage bolts up to  $\frac{3}{4}$  x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to  $\frac{3}{4}$  x 4-in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed square, \$2.90 off per 100 lb.; hexagon, \$2.90 off. Structural rivets,  $\frac{3}{4}$  to 1 $\frac{1}{4}$  in., 4c. to 4.15c., base, Chicago in carloads lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to  $\frac{3}{4}$  x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to  $\frac{3}{4}$  x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, \$3.25, and hexagon, \$3.25 off per 100 lb.; lag screws, 65.

**Wire Products.**—The advance in the price of wire for fourth-quarter contracts is expected to prove to be an anticipation of corresponding advances in other wire products the sale of which is restricted to 60-day periods. The general business in wire is light, but recent reports from jobbers indicate some picking up in the sales of wire nails. We quote as follows: Plain wire, Nos. 6 to 9, base, \$2.839; wire nails, \$2.689; painted barb wire, \$2.839; galvanized barb wire, \$3.539; polished staples, \$2.839; galvanized staples, \$3.539; Chicago.

**Old Material.**—The purchase of heavy melting and shoveling steel scrap by a local independent mill, amount reported as 15,000 tons, has added some strength to the old material market. An advance of 75c. per ton over the price at which the recent Gar order was placed was established, with a differential of 50c. between heavy melting and shoveling steel grades. The market also gathered some strength from the greater scarcity of country and dealer scrap. Yard dealers are not only finding their operations handicapped by lack of labor, but seem disposed to limit their output through the summer months. While consumers of rolling-mill scrap are showing very little interest, this tightening up in supply is making slightly higher quotations. Foundry scrap, however, seems unimproved and a sale of railroad malleable \$11.25, delivered, is reported. Railroad offerings of scrap, to close this week, include 3000 tons from Santa Fe, 2100 tons from the Milwaukee, 2600 tons from the Burlington and 4000 tons from the Rock Island. A typographical error in the issue of July caused the quotation for No. 1 railroad wrought in the market to appear as \$14.25 to \$14.50, whereas it should have been \$15 to \$15.50. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$18.50 to \$19.00
Relaying rails.....	19.50 to 20.50
Old carwheels.....	12.00 to 12.25
Old steel rails, rerolling.....	15.50 to 15.75
Old steel rails, less than 3 ft.....	15.00 to 15.25
Heavy melting steel scrap.....	15.25 to 15.50
Frogs, switching and guards, cut apart.....	15.25 to 15.50
Shoveling steel.....	14.75 to 15.00
Steel axle turnings.....	9.25 to 9.75
Per Net Ton	
Iron angles and splice bars.....	\$18.75 to \$19.00
Iron arch bars and transoms.....	19.50 to 20.00
Steel angle bars.....	13.50 to 14.00
Iron car axles.....	26.50 to 27.00
Steel car axles.....	28.50 to 29.00
No. 1 railroad wrought.....	15.25 to 15.75
No. 2 railroad wrought.....	14.25 to 14.50
Cut forge.....	14.25 to 14.50
Pipes and flues.....	10.75 to 11.00
No. 1 busheling.....	12.00 to 12.50
No. 2 busheling.....	8.50 to 9.00
Steel knuckles and couplers.....	13.50 to 14.00
Steel springs.....	14.00 to 14.50
No. 1 boilers, cut to sheets and rings.....	9.25 to 9.75
Boiler punchings.....	13.50 to 14.00
Locomotive tires, smooth.....	20.00 to 20.50
Machine-shop turnings.....	5.50 to 6.00
Cast borings.....	11.00 to 11.50
No. 1 cast scrap.....	11.50 to 12.00
Stove plate and light cast scrap.....	9.25 to 9.75
Grate bars.....	10.00 to 10.25
Brake shoes.....	9.75 to 10.25
Railroad malleable.....	11.25 to 11.75
Agricultural malleable.....	10.75 to 11.25



Cast-Iron Pipe.—The United States Cast Iron Pipe Foundry Company has taken 1000 tons at Milwaukee 100 tons at Winslow, Ill. An inquiry for 300 tons is reported from Garrison, N. D. We quote as follows, per ton, Chicago: Water pipe, 4 in., \$33.50 to \$34; and larger, \$30.50 to \$31, with \$1 extra for class A pipe and gas pipe.

Philadelphia

PHILADELPHIA, PA., July 25, 1916.

Little or no change is apparent. The domestic pig-market is especially dull. Foreign consumers continue to inquire for low phosphorus and Bessemer, one reported for the former calling for 25,000 tons. Pennsylvania Railroad, which had inquired for 2000 tons of plates, shapes and bars for first half year, has raised the quantity to 5000 to 10,000 tons. Iron shapes continue quiet, but some large propositions are being developed. Plates continue active and consumers of steel products, especially plates and stock for bolts and nuts, are complaining because of backward deliveries. A local manufacturer of bolts has lost one or two days a month because of shortage in stock. The tightness which exists in some materials is undoubtedly due to the fact that mills are utilizing open-hearth steel in directions where the greatest profit is to be obtained. This not only makes it impossible for consumers to get material from regular sources, but also throws an extra burden on mills to have a narrow line of products and have adhered to it.

Ore.—In the week ended July 22 arrivals at port consisted of 7700 tons from Cuba, 9889 tons from Sweden, and 11,215 tons from Spain.

Iron.—It is reported that J. P. Morgan & Co. issued an export inquiry for 25,000 tons of low phosphorus, while inquiries from other sources, also report, continue to hold the interest of the trade. Market otherwise presents no special feature. The price situation is flat, with foundry iron continuing quiet. Except for small lots of prompt low phosphorus, domestic demand for that grade is quiet, but prices are strong, the minimum quotation being about \$34, Philadelphia. Basic has been inactive, except for the sale of 1000 tons by a local interest, for which \$19, per ton, was paid. Quotations for standard brands, in buyers' yards, prompt shipment, range as follows:

Western Pa., No. 2 X foundry.....	\$19.75 to \$20.25
Western Pa., No. 2 plain.....	19.50 to 20.00
Pennsylvania, No. 2 X foundry.....	21.25
Pennsylvania, No. 2 plain.....	20.75
Gray forge.....	18.50 to 19.00
Standard low phosphorus.....	19.00 to 19.50
	34.00

Alloys.—The market continues quiet, with both domestic and foreign 80 per cent ferromanganese unchanged at \$175, seaboard, for comparatively nearby. Some sellers ask \$175 for August shipment from England, while for some prompt unrestricted domestic material \$200 to \$225 is asked. For spiegeleisen there has been quoted, although \$50 has been offered in contract. The arrival of 665 tons of English manganese at this port last week is recorded.

Consumers are protesting in many instances that their demands are not satisfied by the makers. They report that the call from both domestic and foreign consumers is as great as ever; in fact, one mill, although it is not taking foreign or war business, is catching up on orders. The Pennsylvania Railroad market for first half delivery. The Pusey & Company, Wilmington, Del., is in the market for this year delivery. Japanese interests are in the market, as are other foreign buyers. Quotations are unchanged at 3.659c. to 4.159c., Philadelphia.

Bessemer bars for delivery within 30 days are quoted at 2.659c., Philadelphia, but open-hearth bars quoted over this price, one mill asking 3.409c., Philadelphia. Iron bars are unchanged at 2.659c., Philadelphia.

Old Material.—New business is light, but two large propositions are said to be in process of completion. An eastern Pennsylvania mill asks 3.159c.,

Philadelphia, on current business, but would accept 3.909c. on a desirable lot.

Billets.—Contracts into the fourth quarter are being booked at \$45 to \$50 for open-hearth rerolling billets, and around \$65 for forging steel.

Sheets.—Eastern Pennsylvania mills quote 3.659c., Philadelphia, for No. 10 blue annealed. The demand is active.

Coke.—Quiet prevails, and what little business there is results from concessions, especially in foundry coke. Spot furnace is quoted at \$2.75 per net ton at oven, and contract at \$2.50. Spot foundry quotations range from \$3.25 to \$3.50 per net ton at oven, and contract at about the same figures. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—The unsatisfactory state of the market continues, the mills showing no interest, and two or three important points still being under embargo. Italy and other European countries are paying high prices for steel and iron axles. The quotation for axles for export shipment is about \$30, seaboard. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$15.00 to \$15.50
Old steel rails, rerolling.....	17.00 to 18.00
Low phos. heavy melting steel scrap.....	20.50 to 21.50
Old steel axles (nominal).....	26.00 to 27.00
Old iron axles (nominal).....	28.00 to 29.00
Old iron rails.....	20.00 to 20.50
Old carwheels.....	15.50 to 16.00
No. 1 railroad wrought.....	19.50 to 20.00
Wrought-iron pipe.....	12.50 to 13.00
No. 1 forge fire.....	13.00 to 13.50
Bundled sheets.....	13.00 to 13.50
No. 2 busheling.....	10.50 to 11.00
Machine-shop turnings.....	8.50 to 9.00
Cast borings.....	10.00 to 10.50
No. 1 cast.....	16.00 to 16.50
Grate bars, railroad.....	11.75 to 12.25
Stove plate.....	11.75 to 12.25
Railroad malleable.....	13.50 to 14.00

Buffalo

BUFFALO, N. Y., July 25, 1916.

Pig Iron.—Inquiries were before the market the past week for considerable tonnages of Bessemer iron for export, aggregating about 30,000 tons. None of these inquiries has materialized into an order, however. The only buying reported of this grade consisted of two local orders of 400 or 500 tons each. The market price for Bessemer is \$21 and over at furnace. In some instances \$22 is asked. In other grades inquiry has been very light. Practically all resale iron in this district has been disposed of, less than 13,000 tons remaining out of 100,000 tons available at the first of the year. The volume of shipments on orders has been large. We quote without change as follows, f.o.b. furnace, Buffalo, for last-half delivery:

No. 1 foundry.....	\$19.00 to \$19.25
No. 2 X foundry.....	18.50 to 19.00
No. 2 plain.....	18.50 to 18.75
No. 3 foundry.....	18.50 to 18.75
Gray forge.....	18.25 to 18.50
Malleable.....	18.50 to 19.00
Basic.....	19.50 to 20.00
Bessemer.....	21.00 to 22.00
Charcoal, regular brands and analysis.....	21.00 to 22.00

Finished Iron and Steel.—Consumers are apparently not in a hurry to cover for far forward business. They know that mill deliveries on current specifications are uncertain, and they are not yet endeavoring to provide for requirements that may be shipped beyond first or second quarters. Demand for delivery of material on books is as keen as at any time since the congestion started, showing that consumers are not accumulating stock. Few cancellations are being made, notwithstanding top prices apply on orders which will take the extended deliveries. A reduction is announced on standard galvanized pipe and galvanized merchant casings. A little more activity is noted in structural lines than for some time. The Buffalo Structural Steel Company has taken 400 tons for the new Bank of Buffalo building and the steel for the International Acheson Graphite Company's new plant on the Niagara River.

Old Material.—Business has consisted principally of shipments on contracts. The continued hot weather has

tended to check activity. Prices remain practically the same as a week ago. We quote dealers' asking prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel.....	\$15.50 to \$16.00
Low phosphorus steel.....	20.00 to 20.50
No. 1 railroad wrought scrap.....	17.25 to 17.75
No. 1 railroad and machinery cast scrap.....	15.50 to 16.00
Steel axles.....	24.00 to 24.50
Iron axles.....	24.00 to 24.50
Carwheels.....	13.00 to 13.50
Railroad malleable.....	15.00 to 15.50
Machine shop turnings.....	6.00 to 6.50
Heavy axle turnings.....	7.25 to 7.75
Clean cast borings.....	14.00 to 14.50
Iron rails.....	11.50 to 12.00
Locomotive grate bars.....	11.00 to 11.50
Stove plate (net ton).....	12.00 to 12.50
Wrought pipe.....	11.50 to 12.00
Bundled sheet scrap.....	13.00 to 13.50
No. 1 busheling.....	11.00 to 11.50
No. 2 busheling.....	15.00 to 15.50
Bundled tin scrap.....	

## Cincinnati

CINCINNATI, OHIO, July 26, 1916—(By Wire).

**Pig Iron.**—An Indiana manufacturer is asking for 2500 tons of malleable for shipment this year. Some competition has developed, but it is asserted that the Ohio and Northern furnaces are not willing to shade their prices to any extent, no matter how attractive the business may be. Foundry iron is dragging, with little or no inquiry from any source in this territory. Resale iron in Iron-ton territory has been reduced to a minimum quantity, but competition from other sources is now a more serious problem to be considered than that of speculative iron. The Southern furnace price on No. 2 foundry ranges from \$14 to \$15, Birmingham basis. Some resale iron is offered at \$13.50, but with the extra expenses added it figures out about the same as the minimum furnace quotation. The consumption of foundry iron is curtailed on account of the hot weather, and quite a number of shipments have been lately held up. Several houses have sent out their salesmen on scouting trips merely to get in touch with buyers and not with any intention of forcing the market. An inquiry for 18,000 tons of Bessemer for export was received last week, but as far as known local firms are not in a position to submit bids on this business. It is reported, but not officially confirmed, that an additional order for forging high explosive shells has been received by a Southern Ohio manufacturer. Based on freight rates of \$2.90 from Birmingham, and \$1.26 from Iron-ton, we quote, f.o.b., Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$17.40 to \$18.40
Southern coke, No. 2 f'dry and 2 soft.....	16.90 to 17.90
Southern coke, No. 3 foundry.....	16.40 to 17.40
Southern coke, No. 4 foundry.....	15.90 to 16.90
Southern gray forge.....	15.40 to 16.40
Ohio silvery, 8 per cent silicon.....	28.26 to 28.76
Southern Ohio coke, No. 1.....	20.76 to 21.26
Southern Ohio coke, No. 2.....	19.76 to 20.26
Southern Ohio coke, No. 3.....	19.26 to 19.76
Southern Ohio malleable Bessemer.....	19.76 to 20.26
Basic, Northern.....	19.76 to 20.26
Lake Superior charcoal.....	21.20 to 22.20
Standard Southern carwheel.....	24.90 to 25.40

(By Mail)

**Coke.**—Shipments have been held up to some extent, and there is no call for 72-hr. coke for filling-in purposes. Furnace coke is also dull and no inquiries are issued from any source. Oven operators are not having any trouble in obtaining cars in which to make shipments. We quote Connellsville 48-hr. coke at \$2.50 to \$2.75 per net ton at oven and the nominal figures given on foundry coke in the Connellsville, Wise County and Pocahontas fields range from \$3.25 to \$3.75. New River foundry coke remains at \$4 at oven.

**Finished Material.**—The local warehouse price on No. 28 galvanized sheets is from 5c. to 5.25c. The mill price is around 4.65c., Cincinnati, or Newport, Ky. The mill quotation is higher than that of the previous week. Some business has been done lately but mostly for carload lots. It is stated that the sheet market is recovering from the recent slight slump. No. 28 black sheets are quoted at 2.90c., Cincinnati, or Newport, Ky. The hot weather has cut off the demand for building material to some extent, but the jobbers welcome this let-up as it enables them to catch up on old orders.

We quote from local store stocks as follows: No. 1 blue annealed sheets, 3.50c.; steel bars and small structural shapes, 3.20c.; plates, 3.50c.; wire nails, \$2 per keg, base; barb wire, \$3.60 per 100 lb. Only a few lists have been changed lately on heavy hardware and mill supplies. High-speed steel is a little easier on manufacturers' prices range from \$2 to \$2.75 per on standard brands.

**Old Material.**—A slight betterment is noted, but a general rule the market is still unsatisfactory. Heavy melting steel is stronger, and locomotive tires have also taken on a small advance. The following are dealers' prices to consumers, f.o.b. at yards, south Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.....	\$11.25 to \$11.75
Old iron rails.....	15.50 to 16.00
Relaying rails, 50 lb. and up.....	21.00 to 21.50
Rerolling steel rails.....	14.50 to 15.00
Heavy melting steel scrap.....	14.25 to 14.75
Steel rails for melting.....	13.00 to 13.50

Per Net Ton	
No. 1 railroad wrought.....	\$13.25 to \$13.75
Cast borings.....	4.75 to 5.25
Steel turnings.....	5.25 to 5.75
Railroad cast scrap.....	11.00 to 11.50
No. 1 machinery cast scrap.....	12.75 to 13.25
Burnt scrap.....	8.25 to 8.75
Iron axles.....	21.00 to 21.50
Locomotive tires (smooth inside).....	19.75 to 20.25
Pipes and flues.....	9.50 to 10.00
Malleable and steel scrap.....	10.75 to 11.25
Railroad tank and sheet scrap.....	8.50 to 9.00

## Cleveland

CLEVELAND, OHIO, July 25, 1916

**Iron Ore.**—Ore continues to come down the lake in very heavy volume. The deep water this week makes possible the moving of very large cargoes; some record breaking loads are being shipped. The steamer W. P. Snyder, Jr., reached Cleveland July 25 with a record cargo of ore amounting to 13,544 tons. The steamer J. M. Schoonmaker sailed from Cleveland the same day with 14,409 net tons of coal, which is said to be the largest coal cargo ever floated. The labor situation in the Mesaba range continues to prove and more underground mines have resumed operation. However, some of these mines which have sized stock piles will remain shut down the remainder of the season. We quote prices as follows, delivered Lake ports: Old range Bessemer, \$4.45; New range Bessemer, \$4.20; old range non-Bessemer, \$3.70; New range non-Bessemer, \$3.55.

**Pig Iron.**—The labor situation is curtailing considerably the consumption of foundry iron, and blast furnaces are feeling the effects in the holding up of shipments. In many foundries where there are no troubles molders have left their jobs temporarily because of the extremely hot weather, making the shortage that previously existed more serious. Toledo malleable foundry all of the men quit with announcement that they would stay out several weeks because of hot weather. The market is extremely tight and local prices are not firm. Quotations on No. 2 foundry iron are nominally maintained at \$18.50, Cleveland, for No. 2, but there appears to be no doubt a fair inquiry would bring out an \$18 price for a town shipment. Southern resale iron is still a depressing influence on Southern foundry iron, but this is claimed to be coming gradually less of a factor in the market. Southern iron is quoted by Cleveland at \$14 to \$14.50, Birmingham, for No. 2 for July and \$14.50 to \$15 for the first half of next year. Hanna & Co. will blow out their Cherry Valley furnace at Leetonia, Ohio, shortly for relining and the furnace of Pickands, Mather & Co. at West Middletown, Pa., has gone out for relining. The Struthers Foundry Company's stack at Struthers, Ohio, which had been out for relining, was blown in July 23 on Bessemer. We quote, delivered Cleveland, as follows:

Bessemer.....	
Basic.....	
Northern No. 2 foundry.....	\$18.70 to \$19.20
Southern No. 2 foundry.....	18.00 to 18.50
Gray forge.....	
Jackson County silvery, 8 per cent silicon.....	28.62 to 29.12
Standard low phos., Valley furnace.....	





go at around \$15. Not enough business is offering to tempt lower quotations. Resale metal has gone at all sorts of prices, according to the disposition of the consumer to overlook the analysis. One of the largest local makers is oversold for the remainder of the year on basic and high grades of foundry, and therefore is more or less independent of present conditions. With the others, shipments continue at a rate enabling them to stave off sharp concessions. Floods have put some Southern foundries out of business for as much as two weeks and have delayed and still delay shipments, but the loss in output occasioned by the same cause will offset this. Furnaces prepared for operation by July 1 have not resumed and probably will not unless conditions change. St. Louis territory, where \$14, Birmingham basis, is mentioned as the price paid for 400 tons, is in a peculiarly advantageous position to secure lowest prices, because it enjoys much lower freight rates via the Tennessee River. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$15.00 to \$15.50
No. 2 foundry and soft.....	14.50 to 15.00
No. 3 foundry.....	14.00 to 14.50
No. 4 foundry.....	13.75 to 14.25
Gray forge.....	13.50 to 14.00
Basic.....	14.50 to 15.00
Charcoal.....	22.00 to 22.50

**Cast-Iron Pipe.**—The sanitary pipe market is quiet—more so than it has been in some time. There is some improvement in water pipe in the way of inquiries. Several export specifications are floating round, but no recent bookings are reported. Quotations appear to remain firm, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 added for gas pipe and 16-ft. lengths.

**Coke.**—Coke is even stiffer than it has been. There has been a strong demand from the middle and extreme West, the South and Southwest and, in fact, the entire Birmingham trade territory for spot shipments of standard beehive foundry. Foundries of all kinds are laying in heavy stocks—as much as two to three months' supply in some instances. Providing against a possible railroad strike is assigned as among the causes for the rush. The bottom price is \$4.25 per net ton at oven, with \$4.50 easily obtained on new business. Furnace coke is in strong demand at \$3.25 to \$3.50.

**Old Material.**—The scrap market shows no signs of altering its hand-to-mouth status. Prices are soft and large stocks are still in the yards of consumers. We quote, per gross ton, f.o.b. Birmingham dealers' yards, as follows:

Old steel axles.....	\$22.00 to \$23.00
Old steel rails.....	10.00 to 10.50
No. 1 steel scrap.....	9.25 to 9.75
No. 1 wrought scrap.....	12.50 to 13.00
No. 1 cast scrap.....	10.50 to 11.00
Extra heavy cast scrap.....	9.50 to 10.00
Stove plate and light.....	9.00 to 9.50
Old carwheels.....	9.50 to 10.00
Tram carwheels.....	9.50 to 10.00

## New York

NEW YORK, July 26, 1916.

**Pig Iron.**—The local pig iron market is drifting and business is at a low ebb. Small-lot inquiries for delivery in the third and the early part of the fourth quarter amount to 500 to 1000 tons. Statements differ as to the extent of shipments. In some cases foundries are urging the forwarding of iron; in others, because of inability to get sufficient labor, certain foundry buyers are holding up shipments in part. Buffalo iron in small lots has been quoted at \$18.50 furnace for No. 2 X or \$21.08 delivered in New England. There is still some resale iron to be had under this price. New York speculators in Southern warrants have recently closed out considerable lots at prices from \$1 to \$1.50 below what could have been done at the high point for Southern iron. A large foreign inquiry for low phosphorus iron is reported, and there is still a call for Bessemer iron from Italy and France. There has been a quite general participation of furnaces in the recent export business. The outlook is for a featureless summer market so far as the domestic trade is concerned. We quote at tidewater for early delivery: No. 1 foundry,

\$20.50 to \$21; No. 2 X, \$19.75 to \$20.25; No. 2 pig, \$19.50 to \$20; Southern iron at tidewater, \$20 to \$21 for No. 1 and \$19.50 to \$20 for No. 2 foundry and No. 2 soft.

**Ferroalloys.**—Foreign inquiry for ferromanganese is of more immediate interest than domestic business which is limited to sales of a few carload lots at \$175, seaboard. Export inquiries amount to about 400 tons, one being for 2000 tons. Japan is asking for 400 tons. Receipts from England are very liberal and being speedily absorbed by consumers specifying contracts, the demand being rather insistent. Spiegeleisen is quiet at \$50 furnace, but 1500 tons of low grade has been sold to Italy in the last week. Japan is inquiring for 400 tons of 50 per cent ferrosilicon, which is strong at \$80 to \$100 for early delivery. A producer near Baltimore is about to start a new furnace which is stated to have a capacity of about 15,000 tons per year.

**Finished Iron and Steel.**—Dullness in domestic business is frequently commented on. While consumers a number of lines are protected under contracts, placed in the middle of the first half and for third quarter and in most cases for last half of the year delivery—a large percentage of steel consumers have no contracts and are buying minimum quantities. The belief is that the market will go no higher, and by the end of the year may show some drop. Sellers positive these consumers do not appreciate the situation and will find themselves embarrassed. Certain it is the inquiries from abroad are increasingly formal and nowhere is noted any suggestion of weakness in structural material, which has just passed through a pretty dull month. Manufacturing plant extensions still engaging the attention of fabricators except for more closely identified with city structures. For loft and apartment building projects are under way but like the great numbers which have already been before the market, are shelved, awaiting apparent reduction in material costs. One late building project may be regarded as more active than some others. Hess apartment, West End Avenue near Eighty-sixth Street, taking 500 tons. Railroad bridge work has been conspicuous for some time, and some 6500 tons for Southern Railway may now be added, bids having been taken for this amount on July 25. From a fabricator's standpoint the Southern's offering is exceedingly attractive, comprising 100-ft. spans and in all bridges. The Southern is also seeking quick delivery to replace spans washed out in the recent flood. Steel plates, in addition to the continued seeking of ship plates for export shipment, it now seems probable that the Pennsylvania will enter the market for hopper cars and an inquiry for 1000 cars is expected shortly from the Western Pacific. The Gadsden Works wants 1400 center constructions and the Boston 1000 center sills. We quote mill shipment plain structural material at 2.669c. to 2.919c. New York, and even higher in specially prompt work. Steel plates at 2.919c. to 4.169c., depending on the weight of the plate as much as on delivery; steel bars at 2.919c., the lower price for the Bessemer process fairly promptly (which, however, is not so easily obtained), and for open-hearth steel at the cost of the mill but little if any this year; bar iron at \$1.25 New York. Out of warehouse we quote iron bars and shapes at 3.25c. to 3.30c., New York, and at 4c. to 4.25c.

**Cast-Iron Pipe.**—No important municipal contracts are announced in this immediate territory, but a considerable number of purchases of quantities from 100 to 150 tons are being made by public bodies. Small jobs of this character are especially numerous throughout New York. Private buying continues brisk, the volume of this class of business somewhat larger than at the corresponding time last month. The Warren Foundry & Machine Company the successful bidder and has been awarded the contract for 2800 tons of 30-in. pipe on which bids were received at Perth Amboy, N. J., July 12. Carload lots of class B and heavier, are firmly held at \$30.50



ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

**Old Material.**—Practically no change has occurred in the character of the demand. Inquiry is almost completely lacking, and transactions are few and small. About the only life shown in any class of old material is in relaying rails, which are quite scarce, and in old axles, which are wanted for export. It is stated that some axles were sold the past week as high as \$34 or more per gross ton. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications).....	\$12.00 to \$12.25
Old steel rails (short lengths) or equivalent .....	12.75 to 13.25
Relaying rails .....	28.00 to 30.00
Rerolling rails .....	16.00 to 16.50
Iron car axles .....	26.00 to 27.00
Steel car axles (for domestic use).....	28.50 to 29.00
Steel car axles (for export).....	30.00 to 31.00
No. 1 railroad wrought.....	18.00 to 18.50
Wrought-iron track scrap.....	15.00 to 15.50
No. 1 yard wrought, long.....	14.50 to 15.00
No. 1 yard wrought, short.....	12.00 to 12.25
Light iron (nominal).....	4.00
Cast borings (clean).....	7.50 to 7.75
Machine shop turnings (nominal)....	4.50 to 5.00
Mixed borings and turnings.....	4.50 to 5.00
Wrought pipe .....	10.00 to 10.50
Old carwheels (nominal).....	15.00 to 15.50
Malleable cast (railroad).....	12.25

Some improvement in demand from foundries was observed for a few days of the past week, but the demand has again fallen off. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York.

No. 1 cast (machinery).....	\$16.00 to \$16.25
No. 2 cast (heavy).....	15.00 to 15.25
Stove plate .....	12.00 to 12.25
Locomotive grate bars.....	12.00 to 12.25

## British Steel Market

### More Inquiry for American Billets—Pig Iron Output Is Increasing

LONDON, ENGLAND, July 26, 1916.—(By Cable.)

Pig iron is firm and moderate licenses for France are being granted. Midland brands have been officially advanced 5s. The output of hematite iron is expected to increase next month. There is more inquiry for American billets at \$62 to \$63. Tin plates are depressed at 28 to 29s. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 28s. to 29s. against 30s. to 31s. a week ago.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.
Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
Steel rails, export, f.o.b. works port, £10 17s. 6d.
Hematite pig iron, f.o.b. Tees, about 140s.
Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
Steel bars, export, f.o.b. Clyde, £18.
Ferromanganese, £35 nominal.
Ferrosilicon, 50 per cent, c.i.f., £29.

The Hirsch Rolling Mill, at St. Louis, Mo., after being idle for five years, started up again July 22. The plant has an annual capacity of about 60,000 tons and is equipped to produce bar iron and steel, small angles and shapes, reinforcing bars for concrete construction and light rails. Marcus A. Hirsch is president and general manager; Thomas Cunningham, formerly general manager of the Republic Iron & Steel Company's plant at East St. Louis, is general superintendent, and Louis St. Clair, formerly with the Republic Company, is master mechanic. C. C. Denniston is assistant to the president.

The first order placed for the Russian Government by the Imperial Munitions Board at Ottawa is for 7000 box cars, and has been divided chiefly between the Canadian Car & Foundry Company and the National Steel Car Company, both of Canada. The total orders to be placed by the board are likely to reach 50,000 cars.

## Iron and Industrial Stocks

NEW YORK, July 26, 1916.

Whether the tide of speculation has definitely turned upward remains to be seen, but the fact is apparent that values the past week have quite generally improved under the splendid financial showing made by various industries. Some of the steel stocks made quite sharp gains. The dominating influences of the week appeared to be decidedly favorable to higher prices. The range on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com. 19 - 22	Pressed Stl., pref. 100 3/4
Allis-Chal., pref. 71 1/2 - 74 1/2	Ry. Steel Spring, com. 43 1/4 - 45 1/4
Am. Can., com. 54 1/2 - 56 1/2	Republic, com. 43 1/2 - 48
Am. Can., pref. 108 1/2 - 110 1/2	Republic, pref. 108 1/4 - 110 1/4
Am. Car & Fdy., com. 54 1/2 - 59 1/2	Sloss, com. 40 1/4 - 44 1/4
Am. Loco., com. 65 1/4 - 68	Pipe, com. 20 - 20 1/4
Am. Loco., pref. 100 - 101	U. S. Steel, com. 84 1/4 - 87 1/4
Am. Steel Fdries. 46 - 50 1/4	U. S. Steel, pref. 117 1/4 - 118
Bald. Loco., com. 67 1/2 - 74 1/4	Va. I. C. & Coke. 43 1/4 - 45
Bald. Loco., pref. 105 1/2 - 105 1/2	Westing. Elec. 54 1/4 - 58 1/4
Beth. Steel, com. 439 - 449	Am. Rad., com. 397
Beth. Steel, pref. 126 - 130	Am. Ship, com. 41 1/4 - 44
Colorado Fuel. 42 1/4 - 46	Am. Ship, pref. 87 - 87 1/2
Gen. Electric. 163 1/4 - 170 1/4	Chic. Pneu. Tool. 68 1/4 - 70
Gt. No. Ore Cert. 35 - 36	Lake Sup. Corp. 10 1/4 - 11
Int. Harv. of N. J., com. 115 1/4 - 117 1/4	Warwick 9 1/4
Int. Harv. of N. J., pref. 120	Cruc. Steel, com. 60 - 71 1/2
Int. Harv. Corp., com. 80	Cruc. Steel, pref. 114 1/4 - 114 1/4
Lacka. Steel. 68 - 73 1/4	Harb-Walk, Refrac., com. 95
Nat. En. & Stm., com. 23 1/4 - 24	Harb-Walk, Refrac., pref. 102
N. Y. Air Brake. 122 - 126	La Belle Iron, com. 51 - 51 1/4
Pitts. Steel, pref. 98	Driggs-Seabury. 98 1/4 - 105
Pressed Stl., com. 44 1/4 - 50 1/4	Midvale Steel. 60 - 64 1/4

## Dividends

The Stewart-Warner Speedometer Company, regular quarterly, 1 1/2 per cent on the common stock, and 1 1/2 per cent on the preferred stock, both payable Aug. 1.

The Cambria Steel Company, regular quarterly, 1 1/4 per cent, payable Aug. 15.

The Dominion Bridge Company, Ltd., regular quarterly, 2 per cent and extra 3 per cent, payable Aug. 15.

The Packard Motor Car Company, regular quarterly, 1 1/4 per cent on the common stock, payable Aug. 1.

The Penn Seaboard Steel Corporation, quarterly, \$1 per share, payable Aug. 1.

The Torrington Company, \$1 per share on the common stock, payable Aug. 1.

The United States Steel Corporation, regular quarterly, 1 1/4 per cent on the preferred stock, payable Aug. 30, and regular quarterly, 1 1/4 per cent, and 1 per cent extra on the common stock, payable Sept. 29.

The Eastern Steel Company, regular quarterly, 1 1/4 per cent on the first preferred stock and an extra dividend of 21 per cent on account of accrued dividends, payable Sept. 15.

The International Harvester Corporation and the International Harvester Company of New Jersey, regular quarterly, 1 1/4 per cent on the preferred stocks, payable Sept. 1.

The Ontario Steel Products Company, Ltd., regular quarterly, 1 1/4 per cent, payable Aug. 15.

## Domestic Ferromanganese Situation

The very much easier situation in ferromanganese is the occasion of some concern to domestic manufacturers. There is scarcely a merchant furnace which can make 80 per cent alloy on domestic ores and show an adequate profit on the basis of the current price of \$175, and large buyers seem able to get even lower prices. The ability of some merchant furnaces making spiegeleisen to get a profit at, say, \$2 to \$2.25 a unit, which is the equivalent of ferromanganese contract prices, is also a question, if they in turn pay the prices that have been talked of for domestic ores. Meanwhile, there are intimations that the Steel Corporation is willing to consider orders for ferromanganese at going prices. It is probable that one independent interest, availing itself of its leasing arrangement, which permits of intermittent operation of the furnace it has taken, will temporarily discontinue the manufacture of ferromanganese, pending an improvement in the market.

The J. J. Davenport Corporation was recently incorporated with a capital stock of \$10,000 to continue the business of J. J. Davenport at 97 Liberty Street, Brooklyn, steel merchant. J. J. Davenport is president and treasurer, A. C. Anderson, vice-president, and S. C. Adler, secretary.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

**Structural Material.**—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, 1/4 in. thick and over, and zeos 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in. on one or both legs.	.10
Angles, 3 in. on one or both legs less than 1/4 in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

**Plates.**—Tank plates, 1/4 in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or 1/2 of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers).	.10
Boiler and flange steel plates.	.15
"A. B. M. A." and ordinary firebox steel plates.	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras	Cents per lb.
Rectangular, 1/4 in. thick, over 6 in. wide to 100 in. wide.	Base
Lighter than 1/4 in., to 3/16 in., up to 72 in. wide.	.10
*Lighter than 1/4 in., including 3/16 in., over 72 in. to 84 in.	.20
*Lighter than 1/4 in., including 3/16 in., over 84 in. to 96 in.	.30
*Lighter than 1/4 in., including 3/16 in., over 96 in. to 100 in.	.40
*Lighter than 1/4 in., including 3/16 in., over 100 in. to 102 in.	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide.	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84 in.	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96 in.	.35
Lighter than No. 8, including No. 10, up to 60 in. wide.	.30
Lighter than No. 8, including No. 10, over 60 in. to 64 in.	.35
Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered 1/4 in.	

Over 72 in. must be ordered 1/4 in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.  
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.  
Over 72 in., ordered weight 3/16 in., take No. 8 price.  
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras	Cents per lb.
Over 100 in. to 110 in. inclusive.	.05
Over 110 in. to 115 in. inclusive.	.10
Over 115 in. to 120 in. inclusive.	.15
Over 120 in. to 125 in. inclusive.	.25
Over 125 in. to 130 in. inclusive.	.50
Over 130 in.	1.00

Length Extras	Cents per lb.
Universal plates 80 ft. long up to 90 ft. long.	.05
Universal plates 90 ft. long up to 100 ft. long.	.10
Universal plates 100 ft. long up to 110 ft. long.	.20

Cutting Extras	Cents per lb.
No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive.	.25
Lengths under 2 ft. to 1 ft. inclusive.	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in. (width extra).	.30
Circles over 100 to 110 in. (width extra).	.35
Circles over 110 to 115 in. (width extra).	.40
Circles over 115 to 120 in. (width extra).	.45
Circles over 120 to 125 in. (width extra).	.55
Circles over 125 to 130 in. (width extra).	.80
Circles over 130 in. (width extra).	1.30
Circles under 3 ft. to 2 ft. inclusive.	.55
Circles under 2 ft. to 1 ft. inclusive.	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts.	.20
Plates sheared to a radius take complete circle extras.	

\*Including extra for width.

**Wire Rods.**—Including chain rods, \$55 to \$60.

**Wire Products.**—Prices to jobbers effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.45; galvanized, \$3.15. Galvanized barb wire and staples, \$3.35; painted, \$2.65. Wire nails, \$2.50 to \$2.60. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.50. Woven wire fencing, 6 1/2 per cent off list for carloads, 60 1/2 off for 1000-rod lots, 59 1/2 off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.									
Nos.	6 to 9	10	11	12	12 1/2	13	14	15	16
Annealed	\$2.50	\$2.55	\$2.60	\$2.65	\$2.75	\$2.85	\$2.95	\$3.05	
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10	

**Wrought Pipe.**—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from April 21, 1916, and on galvanized from July 24, 1916, all full weight pipe:

Butt Weld					
Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/8, 1/4 and 3/8	63	35 1/2	1/8 and 1/4	52	24
1/2	67	51 1/2	3/8	53	25
3/4 to 3	70	55 1/2	1/2	57	38
			3/4 to 1 1/2	60	43
Lap Weld					
2	65	50 1/2	1 1/4	48	31
2 1/2 to 6	68	53 1/2	1 1/2	54	38
7 to 12	65	49 1/2	2	55	39
13 and 14	53 1/2	..	2 1/2 to 4	57	42
15	51	..	4 1/2 to 6	57	42
			7 to 12	56	41
Reamed and Drifted					
1 to 3, butt	68	53 1/2	3/4 to 1 1/2, butt	55	37
2, lap	63	48 1/2	1 1/4, lap	43	25
2 1/2 to 6, lap	66	51 1/2	1 1/2, lap	49	32
			2, lap	50	33
			2 1/2 to 4, lap	52	36

Butt Weld, extra strong, plain ends					
1/8, 1/4 and 3/8	59	40 1/2	1/8, 1/4 and 3/8	52	34
1/2	64	50 1/2	1/2	57	43
3/4 to 1 1/2	68	54 1/2	3/4 to 1 1/2	61	45
2 to 3	69	55 1/2			
Lap Weld, extra strong, plain ends					
2	63	49 1/2	1 1/4	50	33
2 1/2 to 4	66	52 1/2	1 1/2	55	39
4 1/2 to 6	65	51 1/2	2	57	42
7 to 8	61	45 1/2	2 1/2 to 4	59	45
9 to 12	56	40 1/2	4 1/2 to 6	58	44
			7 to 8	52	38
			9 to 12	47	33

Butt Weld, double extra strong, plain ends					
1/8	55	43 1/2	1/8	44	31
3/4 to 1 1/2	58	46 1/2	3/4 to 1 1/2	47	34
2 to 2 1/2	60	48 1/2			
Lap Weld, double extra strong, plain ends					
2	55	43 1/2	1 1/2	44	30
2 1/2 to 4	57	45 1/2	2	44	30
4 1/2 to 6	56	44 1/2	2 1/2 to 4	46	35
7 to 8	51	35 1/2	4 1/2 to 6	45	34

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

**Sheets.**—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8		2.95 to 3.20
Nos. 9 to 10		3.00 to 3.25
Nos. 11 and 12		3.05 to 3.30
Nos. 13 and 14		3.10 to 3.35
Nos. 15 and 16		3.20 to 3.45
Box Annealed Sheets, Cold Rolled		
Nos. 17 to 21		2.70 to 2.80
Nos. 22 and 24		2.75 to 2.85
Nos. 25 and 26		2.80 to 2.90
No. 27		2.85 to 2.95
No. 28		2.90 to 3.00
No. 29		2.95 to 3.05
No. 30		3.15 to 3.25
Galvanized Sheets of Black Sheet Gage		
Nos. 10 and 11		3.25 to 3.35
No. 12		3.35 to 3.45
Nos. 13 and 14		3.35 to 3.45
Nos. 15 and 16		3.45 to 3.55
Nos. 17 to 21		3.60 to 3.70
Nos. 22 and 24		3.70 to 3.80
Nos. 25 and 26		3.85 to 3.95
No. 27		4.10 to 4.20
No. 28		4.25 to 4.35
No. 29		4.40 to 4.50

**Boiler Tubes.**—Discounts on less than standard, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		Standard Charcoal Iron	
1 1/8 in.	35	1 1/8 in.	27
1 1/4 and 2 in.	47	1 1/4 and 2 in.	39
2 1/4 in.	44	2 1/4 in.	36
2 1/2 and 2 3/4 in.	50	2 1/2 and 2 3/4 in.	42
3 and 3 1/4 in.	55	3 and 3 1/4 in.	47
3 1/2 to 4 1/2 in.	56	3 1/2 to 4 1/2 in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1 3/4 in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.  
2 in. and larger, over 22 ft., 10 per cent net extra.



## Metal Markets

### The Week's Prices

		Cents Per Pound for Early Delivery					
Copper, New York		Tin,	Lead		Spelter		
		Electro-lytic	New York	New York	St. Louis	New York	St. Louis
July	Lake						
19.....	25.25	25.00	37.00	6.25	6.10	9.50	9.25
20.....	25.25	25.00	38.00	6.25	6.10	9.87½	9.62½
21.....	25.25	25.00	38.50	6.25	6.10	10.12½	9.87½
22.....	25.25	25.00		6.25	6.10	10.25	10.00
24.....	25.25	25.00	38.00	6.20	6.00	10.50	10.25
25.....	25.25	25.00	38.00	6.20	6.00	10.50	10.25

NEW YORK, July 26, 1916.

Copper is slightly stronger but demand continues light. Tin is higher following fairly good buying. Lead is dull and weak. Spelter is higher but the domestic buying has tapered off. Antimony is dull and inactive.

### New York

**Copper.**—The market is a little stronger as a result of increased inquiry and the gradual absorption of the resale metal on which attention has been centered for some weeks. Not all of this copper has disappeared, by any means, but enough has been taken to impart the firmer tone referred to. If the producers have reduced their quotations they are not saying so publicly, but there is a feeling that some of the smaller ones have offered concessions. At £122, the London market for electrolytic is unchanged from this time a week ago. The exports this month, including yesterday, total 28,917 tons, which is a good showing. Electrolytic was to be had in New York yesterday, prompt delivery, at about 25c., cash, 30 days, and Lake at 25.25c., cash.

**Tin.**—Fairly good sales have been made in the past week, and the market has a decidedly better tone. Spot Straits was quoted yesterday at 38c. The activity started on July 19 with a good demand and fair sales, taking in futures and tin afloat, with the result that at the end of that day sellers were somewhat scarce and the market became strong for the first time in months. Business tapered off on the following day and on July 21 the market was quiet again. On Monday there was widespread inquiry which resulted in moderate sales in which, however, only a few buyers figured, most of them dealers. This buying continued until yesterday. The London market is sympathetic with that in New York, and quickly responds to any change here, so much so that it has advanced sharply on the slightest show of any better tone here, thereby tending to halt business in this market. Spot Straits was quoted in London yesterday at £167. The arrivals this month total 2055 tons, and there was afloat yesterday 2396 tons.

**Lead.**—In this metal there has been little or no change, and the market is weak and drifting. It is believed consumers want lead and that a good movement would follow a reduction to 6c., New York. The leading interest continues to quote 6.50c., New York, and 6.42½c., St. Louis, but independent sellers have offered down to 6.20c., New York, and 6c., St. Louis. It can be reiterated that present prices will not hold unless there comes a good volume of foreign orders. It is well understood in the trade that production is exceeding consumption. The exports this month, including yesterday, total 2126 tons.

**Spelter.**—In the past 10 days there has been a good demand from abroad which is not believed to be entirely satisfied. Domestic galvanizers who bought heavily when the market dropped slightly below 9c. for spot are less active. Their buying tapered off with the price advances which came with the buying. Prompt was quoted yesterday at about 10.50c., New York, and 10.25c., St. Louis; August at about 10.25c., and September at about 10c. The last quarter is nominally 9.50c. The London market has advanced steadily, and whereas it stood at £48 a week ago it was quoted yesterday at £60, yesterday's cable reporting an advance of £4. Domestic buyers seem to be of the

opinion that the spot price should be around 8c., but the producers maintain that the present cost of production makes that total about equal to the 5c. of normal times. None of the galvanizers are operating over 50 per cent and some of them are not running over 35 or 40 per cent of capacity. The exports of this month, including yesterday, reached the large total of 5648 tons.

**Antimony.**—For metal in bond 11c. has been paid. The market continues extremely dull, although a little inquiry is cropping out. Offerings of spot at 13.50c., duty paid, have elicited no orders.

**Aluminum.**—No change is reported and No. 1 virgin aluminum, 98 to 99 per cent pure, is quoted at 58c. to 60c.

**Old Metals.**—The market has apparently stopped in its downward course and the result is more activity. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	22.00 to 23.00
Copper, heavy and wire.....	21.00 to 22.00
Copper, light and bottoms.....	17.00 to 18.00
Brass, heavy.....	13.00 to 14.00
Brass, light.....	10.00 to 10.50
Heavy machine compositions.....	17.00 to 18.00
No. 1 yellow rod brass turnings.....	13.50 to 14.50
No. 1 red brass or composition turnings.....	14.50 to 15.50
Lead, heavy.....	5.75
Lead, tea.....	5.25
Zinc.....	7.00 to 8.00

### Chicago

JULY 24.—With moderate activity, copper prices have held firmly, except that casting and Lake are now in a more normal relation to each other. Spelter has proved a mild surprise, and is again above 10c. While the leading interest still holds its lead price at 6.45c., 6.20c. has been done. We quote: Casting copper, 24.50c. to 25c.; Lake copper, 26c.; tin, carloads, 38.75c., and small lots, 40.50c.; lead, 6.20c. to 6.45c.; spelter, 10.50c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 16c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 17.75c.; copper bottoms, 15.75c.; copper clips, 16.75c.; red brass, 15.50c.; yellow brass, 11.50c.; lead pipe, 4.50c.; zinc, 5c.; pewter, No. 1, 27c.; tin foil, 27c.; block tin pipe, 32c.

### St. Louis

JULY 24.—Some metals have been a little stronger and others a little weaker. The close to-day was as follows: Lead, 6.12½c.; spelter, 10c. to 10.25c.; tin, 38c. to 39c.; Lake copper, 26c.; electrolytic copper, 25.50c.; antimony, 14.50c. to 15c. The leading interest's price on lead was 6.42½c., but independent producers made the figure about three-tenths of a cent lower. In the Joplin ore district the tone was better. Zinc blende, 60 per cent, ranged from \$75 per ton down to \$50 for the second grades, with the average for the week's output \$63. Calamine ranged from \$40 to \$50, with the average for the week \$45. Lead ore was slightly weaker and the average price for the week was \$70. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 7.50c.; heavy yellow brass, 10.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c.; pewter, 25c.; tin foil, 30c.; zinc, 4.50c. to 5c.; lead, 5c.; tea lead, 3.50c.

### German Pig-Iron Output for May

The German pig-iron production for May was 1,112,574 metric tons, against 1,073,706 tons in April. This is the largest war output except that for March, which was 1,114,194 tons. The output in May, 1915 and 1914, was 985,968 tons and 1,607,193 tons respectively. The May output this year was made up of 161,191 tons of foundry iron, 4646 tons of Bessemer iron, 713,425 tons of open-hearth iron, 212,430 tons of steel-making iron and speigeleisen, and 20,882 tons of forge or puddle iron.

Coke production in Alabama in 1915 was 3,071,811 net tons, or 12,338 tons less than in 1914. By-product coke increased from 2,031,535 tons in 1914 to 2,070,334 tons. To produce the bee-hive coke, 1,708,228 tons of coal were used, against 2,987,710 tons for by-product coke.

## OBITUARY

EMERSON LEE FOOTE, formerly vice-president and general manager of the Sligo Iron Furnace Company, St. Louis, Mo., died at his home in that city, July 20, aged 67 years. He was born in Milwaukee, Wis., but went to St. Louis early in his business career. He leaves his widow, four sons and one daughter.

CHARLES H. BRADLEY, once prominent in the stove industry in Pittsburgh, died July 20 at his home in Bridgeport, Conn., aged 57 years. He was born in Pittsburgh, and retired from business about 15 years ago. He leaves his widow, one son and two daughters.

THOMAS E. NASH, a director of the Carey Machinery & Supply Company, Baltimore, Md., died July 17, aged 46 years. He became connected with the company at the age of 16. He leaves his widow.

EDWIN V. SMITH, president Eccles & Smith Company, machine tools and railroad supplies, San Francisco, died July 12, aged 48 years.

ROBERT J. COLLINS, sales manager Cataract Refining & Mfg. Company, Buffalo, N. Y., died in that city July 20.

### A Safety Feature of the McDonald Mills

In the construction of the McDonald mills of the Carnegie Steel Company, between Girard and Niles, Ohio, provision is made for a tunnel through which employees can reach their places in perfect safety. Entering the yard by means of a viaduct over the railroad tracks, the workers go down an incline into the subway, which is so constructed that each can reach his department. Thus the testing building will be the first reached, then in turn the machine shops and the bar mills, which are numbered in rotation. The tunnel walls will be painted white and it will be electrically lighted. The safety secured by the new arrangement is in contrast with conditions requiring employees to pilot themselves through the mills properties to their various departments, usually over crane and metal yards, along dinkey tracks and through buildings where their unfamiliarity with the operation might lead to accidents.

Electric power for the McDonald mills will be transmitted a distance of eight miles, being generated by large gas engines at the Ohio Works in Youngstown and conveyed by a line now nearly completed. Just to the south of the works site, the company owns 500 acres of land extending three-quarters of a mile from the high level Girard-Niles road on the south side of the river, to the chain of railroad tracks that girdle the Mahoning valley, thence fully a mile east and west, and on this tract a model borough for employees is to be built. The employees will be given the opportunity to purchase homes.

An iron and steel foundry in Malaga, Spain, known as Los Altos Hornos de Andalucia, has been reorganized with Belgian and French capital. Two decades ago it was one of the principal industrial establishments of that district but it failed a few years ago and has since been closed. Its capacity is about 150 tons of iron and 50 tons of steel castings per day, or a combined output of about 75,000 tons per year. The present production is to be kept down to 45,000 tons, 15,000 tons of which will be sold in Spain, the remainder being sent probably to France.

The International Oxygen Company, 115 Broadway, New York, is installing a new plant at College Point, Long Island, for the manufacture of oxygen and hydrogen gas, which will be completed late in August or early in September. When the plant is in operation the company's trade in Brooklyn and environs, as well as in Manhattan, will be largely handled from this point. Heretofore this local business has been supplied from the company's Newark works.

### Page Company to Make Copper Clad Wire

The Page Woven Wire Fence Company, Monessen, Pa., has made an arrangement with the Copper Clad Steel Company, Pittsburgh, with works at Rankin, Pa., by which it secures exclusive control of its product of copper clad rods to be drawn into copper clad wire. This new product will be known as "copperweld" wire, and is stated to be wire with an absolute weld between the copper and steel. The Page Company states it is prepared to furnish the wire in two grades of conductivity, 40 and 30 per cent, and that other grades will be furnished under special arrangements.

The Page Woven Wire Fence Company was organized in 1886, and established a plant at Adrian, Mich. Its business expanded rapidly and in 1899-1900 it built an open-hearth steel plant, rod and wire mills at Monessen, Pa., where the first steel was made May 31, 1900. Its plant at Monessen contains two 60-ton basic open-hearth furnaces, two Morgan reheating furnaces, a 25-in. 3-high, one stand blooming mill, a semi-continuous rod mill with 14-in. 2-high, four-stand continuous billet mill, a 12-in. 2-high, 5-stand, and a 10-in. 2-high, 5-stand, continuous mill, an 8-in. 2-high, 4-stand, looping mill, one 1500-lb. steam hammer, 212 wire drawing blocks for wire to 20 gage, three galvanizing furnaces with an annual capacity of 25,000 net tons of wire and 81 machines for making barb and woven wire fence. The annual capacity is 60,000 tons of ingots, 60,000 tons of wire rods, 50,000 net tons of wire products and 6000 tons of wire rope and springs. The Michigan works turn out wrought-iron fence, ornamental iron work, windshields for automobiles, etc.

### Copper Tax Eliminated

WASHINGTON, D. C., July 25, 1916.—The Senate Finance Committee, in view of the protests of producers, smelters, and refiners of copper, has decided to strike from the omnibus revenue bill the tax on that metal, which, if this recommendation prevails, will pay only the munitions tax on such quantities as may be actually consumed in the production of war material. The committee's amendment striking out the special tax on copper must now run the gauntlet of the Senate and of the conference committee, but indications point to the final elimination of the tax, the leaders of both houses having been convinced of the unfairness of levying a special impost on one of a dozen metals used in the manufacture of munitions, especially when that metal is already twice taxed as a component part of war materials subject to the munitions tax and as the product of corporations paying the corporate income tax.

Not only has much time been consumed in hearings before the sub-committee having the munitions tax in charge, but further delay has been occasioned by the necessity of finding some other source of revenue to supply the \$12,000,000 cut off through the abandonment of the copper tax. At this writing, the committee is undecided as to how this money shall be raised, but the sub-committees having concluded their deliberations, the full committee will now address itself to this serious problem.

W. L. C.

### Manganese Ore from the Crimora Mine

The Crimora Manganese Corporation, 15 Broad Street, New York, has started its crushing and washing mill at Crimora, Va., and is now producing 30 to 40 tons of manganese ore per day. It expects to increase this very soon to 200 tons per day. The ore being turned out is reported to average 44 to 46 per cent manganese and under 10 per cent silica, which is expected to be lowered to 8 per cent.

California's output of chrome ore is said to be greater than ever. For the first six months of 1916 it was more than three times the greatest annual previous yield and is still increasing, according to J. S. Dillon of the U. S. Geological Survey. The reduction in freights by the transcontinental railroads so as to meet the competition of imported ores is said to be an important factor.



## PERSONAL

J. V. W. Reynders, formerly vice-president and general manager Pennsylvania Steel Company at Steelton, Pa., has opened offices at 2218 Equitable Building, 120 Broadway, New York.

Charles M. Schwab has accepted an invitation to attend a dinner to be given in his honor by city officials and other leading men of Baltimore, Md. The invitation was extended by Mayor James H. Preston. The dinner will be held about Oct. 1.

Emmett B. Carter, chief engineer Midvale Steel Company, is president of the Engineers' Club of Philadelphia.

J. E. Thropp, Jr., has resigned as superintendent of Alburtis and Hellertown furnaces of the Thomas Iron Company to become superintendent of the Berkshire furnace of E. J. Lavino & Co., at Sheridan, Pa.

Charles A. Moffett has been elected vice-president and general manager of the Gulf States Steel Company, Birmingham, Ala. Heretofore he has been general manager of the company's steel works at Gadsden, Ala.

E. E. Entwisle has been made mechanical engineer at the Steelton plant of the Bethlehem Steel Company in charge of all construction. He will report to Chief Engineer C. P. Turner. F. E. Howells, superintendent of the machine shop, has been made assistant mechanical engineer and will report to Mr. Entwisle.

William H. Carpenter, general manager Mayo Radiator Company, New Haven, Conn., has resigned to accept a responsible position with the Seymour Mfg. Company, Seymour, Conn. He was formerly superintendent of the Bristol Brass Company, Bristol, Conn.

H. Hildenbiddle, formerly with the Whitaker-Glessner Company, Portsmouth, Ohio, has resigned to accept the position of chief engineer of the Wilmington Steel Company, Wilmington, Del.

John Calder has been made works manager and assistant to Vice-President H. H. Pinney of the Bridgeport, Conn., works of the Remington Arms-Union Metallic Cartridge Company, Inc. For some time he has been serving with the banking house of Willett, Sears & Co., Boston, as an advisory engineer to a number of New England industrial interests, and since 1897 or 1898, when he came to the United States from Glasgow, Scotland, he has been associated with the management of large plants producing interchangeable metal manufactures, notably the Remington Typewriter Company, Ilion, N. Y., of which he was general manager for nine years.

At a recent meeting of the directors of the American Rolling Mill Company, Middletown, Ohio, Charles R. Hook, general superintendent, was elected vice-president of the company. He will continue his duties as general superintendent.

R. L. Lovell, who has been associated with the Illinois Steel Company in the pig-iron sales department, has resigned to take charge of sales for a newly organized mining company having iron ore and calcite deposits in Georgia. He will be located at Atlanta.

P. A. Montanas, vice-president Springfield Machine Tool Company, Springfield, Ohio, has been elected president of the Engineering Club of Springfield.

Charles A. Morrow, formerly of the Pittsburgh office of the A. M. Byers Company, is now associated with F. M. Minninger in the Chicago office.

W. R. Palmer, general superintendent of the American Tube & Stamping Company, Bridgeport, Conn., has been elected vice-president and a director of the company.

Director of Sales J. F. Bowman, of the Federal Motor Truck Company, announces the appointment of V. K. McBride as assistant sales manager of the company, and of H. A. Conlon, as field sales manager. H. M. Rosenberg, formerly branch manager of the White Company at St. Louis, and for five years a member of the White sales force, has joined the sales de-

partment of the Federal Motor Truck Company as a traveling district representative in Western territory.

E. O. Wells, of Chattanooga, has been made superintendent of the Roane Iron Company, Rockwood, Tenn., succeeding Frederick H. Clymer, superintendent of the plant since 1907.

David F. Baker, who has been connected with the blast furnace department of the Broken Hill Proprietary Company's plant at Newcastle, New South Wales, is now in the United States and will take up permanent work here. He is a son of David Baker, who has been at Newcastle for several years.

Robert M. Jones, of Minneapolis, where he was sales representative of the Republic Iron & Steel Company for the Northwest, has joined the local force in the offices at Birmingham, Ala., and will assist General Manager of Sales Barnes.

Charles G. Williams, an automobile and aviation engineer, has resigned from the Mason Motor Company to accept an appointment authorized by the Secretary of War as inspector of United States army aeroplanes and aeroplane motors. His first duties call him to the Curtiss Aeroplane & Motor Corporation, Hammondsport, N. Y.

Albert T. Keller, who as chief engineer of the Indiana Steel Company, has had charge of construction work at Gary, Ind., has accepted the appointment as chief engineer of construction for the Bethlehem Steel Company at Sparrows Point, Md., and will have charge of the extensive new work at the Maryland plant, of which an outline was given in THE IRON AGE of July 20. His successor at Gary is W. H. Bailey, who has been engineer at that plant.

A. C. Garrison, manager at St. Louis of the Columbia lamp plant of the General Electric Company, succeeds his father, the late D. E. Garrison, as president of the Corrugated Bar Company, Buffalo. A. L. Johnson becomes vice-president and general manager, and W. H. Kennedy, vice-president and treasurer. W. M. Armstrong has resigned as vice-president and sales manager.

T. R. Davis has resigned as treasurer of the Vermilion Malleable Iron Company, Hoopeston, Ill., to become general manager of the Artillery Fuse Company, Inc., Wilmington, Del.

J. O. MacIntosh, formerly of Renshaw & Co., coal dealers, Philadelphia, Pa., has been placed in charge of the coal department of Park & Williams, dealers in iron, steel, coal and fire brick, Real Estate Trust Building, Philadelphia.

The Trussed Concrete Steel Company, Detroit, Mich., which was sued some time ago for alleged infringement of the Berger Mfg. Company's metal lumber construction, has been awarded a favorable decision in the United States District Court, which has adjudged the claim upon which patent No. 682,316 was issued to William L. Caldwell as "void for want of patentable novelty and invention." The Trussed Concrete Steel Company announces now that the Kahn pressed steel construction can be used without thought of any interference.

In connection with the announcement that the bridge and construction business heretofore conducted at Steelton, Pa., by the Pennsylvania Steel Company of Delaware, will now be carried on by the Bethlehem Steel Bridge Company of Delaware, the names of the officers of the new company are given as follows: G. H. Blakeley, president; Thomas Earle, vice-president; B. H. Jones, secretary and treasurer, and F. A. Shick, controller.

The American Steam Gage & Valve Mfg. Company, whose general offices and works are in Boston, Mass., is moving its Chicago office and stock room to the new building, 25-27 South Jefferson Street, where the manager, Charles C. Kilander, with a larger and better stock, will be able to serve the trade even more quickly than heretofore.

## STRIKES AND SETTLEMENTS

### Milwaukee Machinists' Strike Extending

MILWAUKEE, WIS., July 25, 1916—(By Telegraph).—Further attempts of Governor Phillips to end the machinists' strike having failed, the union leaders resumed activity to-day after a halt since Friday, calling out thirty-five men at the Evinrude Motor Company's plant. Seven metal polishers quit by direction of Cincinnati headquarters. The scheduled walkout at the Andrew Kopperud shop was postponed, the unions claiming an offer of arbitration was made.

The Governor was authorized to make two propositions to the Metal Trades Association: one to grant a 52-hr. week immediately and guarantee a 50-hr. week within one year; the other to grant a 52-hr. week at once and arbitrate the 48-hr. demand. The employers proposed a comprehensive investigation covering the entire country by the Industrial Commission, but the offer was rejected.

MILWAUKEE, WIS., July 22, 1916.—Approximately 2000 machinists had been called out of seven plants up to Friday afternoon, when the union leaders announced that a "truce" had been declared and that there would be no further walkouts until at least Monday or Tuesday, depending upon the outcome of certain conferences on Saturday and Sunday. E. L. Phillips, Governor of the State, and J. D. Beck, chairman of the Industrial Commission, conferred with strike leaders on Saturday, but it was announced that no headway had been made. The position taken by the employers forming the Milwaukee Metal Trades & Founders' Association was made clear to the public in half-page advertisements published in every daily newspaper of the city on Thursday and Friday. The advertisement described what the employers had done in getting the Industrial Commission to investigate the hours of work in the Middle West and the result of the investigation by which the fact was established that on June 30 the working hours of the Milwaukee metal trades were as short or shorter than those of a large majority of the shops of similar industries in the Middle West. Despite this showing the metal trades manufacturers on July 1 voluntarily reduced the basis of working hours from 55 to 52½ per week, the hourly rate of pay remaining the same, overtime commencing from such 52½-hr. schedule instead of the former 55. "By such action," continues the advertisement, "these manufacturers demonstrated their sincere desire to establish conditions in this district even more favorable than enjoyed by the large majority of employees in other places throughout the Middle West." It concludes as follows: "Under present conditions of trade and competition in the Middle West it is impossible to institute a reduction of working hours to a basis of less than 52½ hr. per week and our shops will remain open on this basis until economic conditions make possible a further shortening of working hours."

The plants affected up to the time the "truce" was called Friday were: Allis-Chalmers Mfg. Company, Pawling & Harnischfeger Company, Nordberg Mfg. Company, Beaver Mfg. Company, Geuder, Paeschke & Frey Company, T. L. Smith Company, and Smith Engineering Company. Some machinists in several small plants also walked out. In every case the number of strikers formed only a small proportion of the total working forces, and no shop was obliged to shut down, although in some instances production was necessarily curtailed. Popular opinion seems to be that the machinists have taken a most inopportune time to strike. The public statement by the employers did much to strengthen their cause, by reason of the fact that not everyone was informed as to the exact status of the controversy until the statement was published.

### New England

Everyone busy up to the limitations imposed by the shortage in labor describes the situation in New England at this time. The labor status is practically unchanged. The molders' strike in Bridgeport drags along and the men are still out in the shops of the

Coulter & McKenzie Company, Automatic Machine Company, Pequonnock Foundry, Monumental Bronze Company and Joseph R. Taylor Company. These foundries are now open shop plants; the owners consider that in granting a flat minimum wage of \$3.75 per day they would be recognizing one of the cardinal principles of the closed shop, and this is now the real issue. A week ago the molders at the Union Mfg. Company, New Britain, Conn., walked out because of differences arising over the amount and time of bonus payments. All but about 50 of Polish nationality have returned to work and a prompt settlement of the difficulty seems assured.

### San Francisco

The waterfront strike in San Francisco has been practically settled, but labor conditions are still unsatisfactory, the structural iron workers having been out since July 10, with considerable work waiting in the shops.

### Ohio Strike Notes

A strike was declared last week by about 200 molders and core makers employed by the Ohio Foundry Company, Cleveland, Ohio, to enforce demands for a recognition of the Molders' Union. Both plants of this company are now shut down. A similar strike was declared several weeks ago against the Interstate Foundry Company, Cleveland, but last week the men returned to work without securing the granting of their demands.

Since May 1 the machinists, toolmakers and sheet-metal workers employed by the Automatic Sprinkler Company of America, Youngstown, have been on strike. Recently the company has been securing new men from other districts, and expects in a short time to be operating its plant to full capacity.

### An Advance at Pottsville, Pa.

The Eastern Steel Company, Pottsville, Pa., on July 21 granted its employees a 10 per cent increase in wages, effective at once. The employees had claimed they were much underpaid, as compared with mills at Philadelphia and Reading.

### Western Puddlers' Scale Settled

At the conferences held in Detroit, Mich., starting last week and concluding on Monday, July 24, a settlement was reached on the puddling and finishing scales between the Amalgamated Association and the mills that sign its scale. Puddlers and finishers will receive an advance of 5 to 7 per cent dating from Monday, July 24. Under the old scale, when bar iron reached 1.30c. puddlers were paid \$6.20; but under the new scale, on a 1.30c. card they will receive \$6.50, the rate advancing 20c. for each 5 points in the bar-iron card. Up to Monday, July 24, puddlers were being paid \$8.40 per ton, based on 1.85c. bar-iron card, but under the new agreement the rate will be \$8.80 per ton on a 1.85c. card. This is the highest rate for puddling ever paid under the Amalgamated scale, with one exception of a short period over 40 years ago. Wages of finishers will also be higher than ever before. Bar-iron mills in Ohio, Indiana, Illinois, Michigan and Missouri that sign the Amalgamated scale all pay the new rate of \$8.80 from July 24.

The Simmons Company, Kenosha, Wis., probably the largest manufacturer of steel beds and box bed springs in the world, has taken out a group insurance policy covering its 5500 employees at Kenosha and San Francisco. The amount of the policy is in excess of \$3,000,000 and is stated to be the largest contract of this kind that has ever been written in the United States.

The University of Illinois has issued a directory of former students, alumni, faculty members and others, with an alphabetical and a geographical arrangement and with occupations indicated. A copy of the book may be had for \$5 by applying to Vergil V. Phelps, editor, University of Illinois, Urbana, Ill.



### Pittsburgh and Nearby Districts

The recently organized Mahoning Valley Steel Company, of which J. D. Waddell is president, is making good progress in the building of its sheet mills at Niles, Ohio. The main building will be 140 x 575 ft. and will be so constructed that it can be extended later to accommodate more mills. This company recently bought the entire equipment of the Atlanta Sheet & Tin Plate Company, Atlanta, Ind.

The Stevens Metal Products Company, Niles, Ohio, has been organized with a capital stock of \$50,000. It will make a line of metal products such as conductor pipe, eaves trough, etc.

The M. & D. Mfg. Company, Youngstown, Ohio, has been organized with a capital of \$75,000 to manufacture metal products.

The Ohio Corrugating Company, Warren, Ohio, has increased its capital stock from \$50,000 to \$100,000, and will make extensions to its works.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, has completed and put in operation three 100-ton open-hearth furnaces, which will give it an increase in its output of open-hearth steel of about 20,000 tons per month. The company now has a total of nine 100-ton furnaces with an annual capacity of close to 500,000 tons.

The Republic Iron & Steel Company will soon commence work on a steel railroad bridge to connect its four blast furnaces at Haselton with its Koppers by-product coke plant, across the Mahoning River at Lansingville, Ohio. The contract for the bridge was placed some time ago with the McClintic-Marshall Company, Pittsburgh.

Recent contracts secured by the Westinghouse Electric & Mfg. Company East Pittsburgh, include two 1500-hp. motors to the Carnegie Steel Company for installation in its Duquesne works, one to be used for operating four roughing mills and the other for driving a 12-in. merchant mill; also a 7000-hp. induction motor for driving a 16-in. plate mill, and a 4000-hp. induction motor for operating a 20-in. merchant mill for the Gary works of the Illinois Steel Company.

The Carnegie Steel Company has decided to install a 12-in. bar mill in its Duquesne steel works. It will be built along the lines of the present 10-in. mill, which has made some notable records for output. The new mill will roll heavier shapes than the 10-in. mill. A 20-ton Heroult electric furnace will also be installed in the Duquesne works. A 10-ton ore bridge is being built at the Duquesne blast furnaces to replace four 5-ton bridges, which will be taken out. There will be two 10-ton bridges at Duquesne when the new one is finished.

The Carnegie Steel Company now has in blast 55 of its 59 blast furnaces. The idle stacks are one Lucy, one Zanesville, one Edgar Thomson and one Bellaire. The Bellaire and Edgar Thomson furnaces are being completely rebuilt and enlarged. Lucy is out for relining. The Zanesville stack is an isolated furnace that has not been operated in some years.

The new butt-weld furnace being added to the pipe mills of the Republic Iron & Steel Company, Youngstown, Ohio, is nearly finished and is expected to be making pipe from ½-in. to 2½-in. in the latter part of August. The lap-weld furnace will not be completed before late in September or October. Automatic stokers are being installed under the boilers at the Brown-Bonnell works of this company, and work will start soon on a new laboratory to be erected at the open-hearth plant in Haselton.

The Phoenix Iron Works Company, Meadville, Pa., has been reorganized, the company having recently satisfied a mortgage of \$100,000 against its plant and equipment, and has sold a new issue of \$250,000 first mortgage bonds, mostly in Pittsburgh. The company has made some extensive improvements and additions to its plant, including an extension to the foundry, an increase in the power plant equipment and extensions to the boiler erection plant. Its products consist of boilers, engines and gray-iron castings. The new offi-

cers are: Joseph McK. Speer, president; W. C. Schade, vice-president and general manager, and E. P. Cullum, secretary and treasurer.

Five of the new 20 hot tin mills being erected for the McKeesport Tin Plate Company, McKeesport, Pa., were started up on Monday, July 24. The other 15 mills are expected to be completed and started in the latter part of August. The company had 22 mills in the old plant, and when the 20 mills are finished it will have the distinction of having the largest single tin-plate plant in the world. S. Diescher & Sons, Pittsburgh, drew the plans and are construction engineers for the entire 20 mills.

The National Tube Company will start up about Aug. 1 the puddling department of its Republic works on the South Side, Pittsburgh, the entire plant having been idle for some years. It contains 40 puddling furnaces and will turn out muck bar to be used in making couplings.

The General Fireproofing Company, Youngstown, Ohio, is having a very heavy demand for all-steel transfer cases for office purposes. It has been turning out about 1000 of these cases per day for some time. Nearly the entire plant is working night and day.

### A Modern Malleable Foundry

The Decatur Malleable Iron Company, Decatur, Ill., expects to begin molding in the first week in August at its new foundry. The buildings are of concrete, brick and steel—side walls about 22 ft. high, and special provision for good ventilation and light. Electric traveling cranes handle all material, including the charging of the melting furnace. Aside from the saving of labor, this feature is noteworthy for doing away with the hard and grimy work of dumping material into the furnace by hand. A blower system cools the shop in summer and heats it in winter. The air furnace is of 20 tons capacity and with 90 to 100 molders the foundry can turn out 20 to 25 tons of malleable castings per day. All castings, both hard iron and annealed, will be cleaned in sand blast mills. The molding equipment consists of 50 pneumatic squeezer molding machines and wherever practicable it is planned to attach vibrator frames to handle patterns, thus avoiding the excess of weight which often attends the making of castings where patterns are rapped by hand. The product will be hardware specialties and malleable parts for automobiles and agricultural implements.

### Locomotive Orders

Locomotive orders in the first three weeks of July have been about 74, with inquiries amounting to only about 35. The American Locomotive Company will build 10 consolidated locomotives for the Duluth, Winnipeg & Pacific, 19 for the Central of Brazil, and 13 for miscellaneous foreign railroads. The Philadelphia & Reading will build 10 switching engines in its own shops. The Cincinnati, New Orleans & Texas has ordered 5 mountain-type locomotives from the Baldwin Locomotive Works and 4 switching engines from the Lima Locomotive Corporation. The Wabash has revived its inquiry for 25 locomotives, and the New York Central is asking for bids on 5 Pacifics.

The Huessener Engineering Company has moved its offices to 1405 Oliver Building, Pittsburgh. Recent orders for the Bradshaw burners include an equipment for 8000 hp. of boilers for the Donner Steel Company, Buffalo, N. Y.; 3600 hp. for the McKeefrey Iron Company, Leetonia, Ohio; 2750 hp. for the Clinton Iron & Steel Company, Pittsburgh, and 1500 for the Sharpsville Furnace Company, Sharpsville, Pa.

The No. 1 Colebrook furnace of the Lackawanna Iron & Steel Company at Lebanon, Pa., which was operated on ferromanganese for several months and in the middle of June was turned to foundry iron, has been blown out for repairs.

# Machinery Markets and News of the Works

## LARGE LATHES ACTIVE

### New Shell Orders Require Heavy Tools

#### General Demand Continues Good—Second-Hand Machines Inflicting No Harm—Big Seattle Exports

Inquiries received by the machine tool trade indicate that the placing of orders for large shells by J. P. Morgan & Co. will result in the purchase of a considerable number of heavy engine and turret lathes by companies to whom contracts are awarded. That such contracts are to be placed is generally accepted, though official confirmation is being withheld at present. New York dealers, however, have received large inquiries for engine lathes with a swing of 22 in. and upward, and several large turret lathes have been bought in the past 30 days by one of the companies mentioned as having been proffered an order for 8-in. shells. The contracts are for shells in sizes from 6 to 12 in., their value being in excess of \$60,000,000.

The general demand for machine tools continues good, both East and West. In Cleveland inquiry is more active, one automobile maker alone inquiring for 75 tools. Several new factories are projected in that city, although from Milwaukee comes complaint of the high cost of building material restricting plant extensions.

In Cincinnati munitions makers are doing some occasional buying, and automobile truck makers are active factors in the market. The export demand in Cincinnati is quiet, except where shipments to Canada are concerned.

Exports from Seattle in the first six months of the year totaled \$194,725,533, or about double that in the same period of 1915.

In Canada the Imperial Munitions Board continues to place orders on a large scale, mostly for shells of the larger sizes.

The offering of second-hand tools is inflicting no injury on the market.

## New York

NEW YORK, July 26, 1916.

The commanding feature of the market is the placing of British orders for large shells through J. P. Morgan & Co. The American Locomotive Company is understood to have received an order for 8-in. shells to the value of \$15,000,000. The American Car & Foundry Company is reported to have an order for 9-in. shells valued at something like \$18,000,000, while negotiations are believed to be under way which will give a contract to the Midvale Steel & Ordnance Company valued at least at \$8,000,000. Other companies mentioned as likely to receive orders are the Bethlehem Steel Company and the American Steel Foundries. The American Locomotive Company is reported to be transferring work from its Richmond, Va., plant to its Schenectady, N. Y., works.

J. P. Morgan & Co., as fiscal agents for the British Government, some time ago asked manufacturers to make an estimate as to how many large shells they could turn out in

a certain time, up to April being mentioned in one instance. It is estimated that the total value of the shell business in prospect will exceed \$60,000,000.

The machine tool trade has received inquiry for large numbers of engine lathes having a swing of 22-in. or more, and in the past thirty days large turret lathes suitably equipped for boring shells of large diameter have been purchased. Members of the trade who have figured on the lathe inquiries were pledged to secrecy. The making of large shells is largely an engine lathe proposition, although large turret lathes are most advantageously used for the inside work, the shell being chucked in the operation. The outside is easily finished in an engine lathe, and, of course, the boring can be done on them also.

As heretofore stated in THE IRON AGE, contracts for 3-in. shells are being rapidly completed by American manufacturers. Some, of course, have considerable distance to go. It is reported that American shell makers have operated more successfully than those in Canada, and it is believed that the policy of Great Britain in the future will be to place all the large shells it can in the United States rather than in Canada, although the Dominion will be favored with extensive fuse contracts. The Canadian plants took shell work at low prices, but the final results are said to have been more expensive than in the United States.

In Toronto a fuse plant is to be established which will have a capacity of 6000 fuses a day. It will utilize some of the equipment used by the Nathan Mfg. Company, New York, which has very successfully handled a fuse contract. The Ashcroft Mfg. Company is expected to undertake additional fuse work.

Aside from war business, the machine tool trade is active. Reassuring reports are heard as to the condition of some second-hand machinery that is on the market. Much of it, of course, is in fairly good condition, but some, in use only six months, is badly battered up.

A local maker of shaping machines is working overtime. Milling machines are difficult to procure for prompt delivery, hundreds being under contract for future delivery. Planers are also well into the future. One maker of boring mills has advanced his prices 10 per cent in the past week.

The copper and other metal companies are liberal purchasers of machines, and close quickly despite high prices.

The Artillery Fuse Company, Inc., Wilmington, Del., is inquiring for machines for facing timing rings. This is a fuse operation.

The General Electric Company, which issued two or three lists recently, is now inquiring for about a dozen large turret lathes.

A large meter company in the vicinity of New York is inquiring for additional equipment.

The railroads are slow in coming into the market, the Pennsylvania being practically the only road that has shown interest, although it was expected that the New York Central and the New York, New Haven & Hartford would be active before this time.

The Atkins Filter Press Corporation, 165 Broadway, New York, would like to get in touch with manufacturers of machinery with a view to contracting for a term of years for the manufacture of its filter presses in sizes from 2 to 10 tons. Shops will be required to make turnings up to 6 ft. in diameter in order to handle the production. S. K. Atkins is president.

The Sprague Electric Works of the General Electric Company, with main offices at 527-531 West Thirty-fourth Street, New York, will shortly erect a new building at its plant at Watsessing, N. J. The structure will occupy property adjoining the existing plant, and will be built paralleling the main shop. It will be of reinforced concrete, 75 x 725 ft., with one end bent back along the Lackawanna tracks for 250 ft., making it ell-shaped. The equipment installed will be of most up-to-date type. S. C. Durland is general manager.

The Schafer Ball Bearing Company, recently incorporated with a capital stock of \$100,000 by F. T. Lyons, M. Daly and C. Barthel, has taken over the business of Barthel & Daly, formerly importers of ball bearings. It has purchased about



50 lots in Hawthorne, N. J., near Paterson, between Second Street and the Susquehanna Railroad, and will at once erect a factory to be completed about Sept. 15, at a cost of about \$25,000. Manufacturing operations are expected to start about Oct. 1 and all sizes of ball bearings will be made, deliveries to start in November. The initial output will be about 2000 bearings a day and about 125 workmen will be employed. C. Barthel is president. The company maintains an office at 1790 Broadway, New York.

The Arrow Motor & Machine Company, recently incorporated with a capital stock of \$100,000 to manufacture engines, motors, special machinery, dies, etc., has purchased the business of the L. Weiscopef Company, 30 Church Street, New York, whose business it continues. The company reports that it has several large contracts for die work and has been very busy since organized, barring the general machinists' strike which began June 14 when all but two of its force quit. It is now employing a larger number of men than before the strike started. The walk-out was against the wishes of the workmen as they were well paid and treated, but were compelled to quit on account of union affiliations. L. Weiscopef is president, M. E. Skerritt, secretary and George H. Timmerman is factory manager.

The Columbia Metal Box Company, manufacturer of electrical and sheet-steel specialties, 226 East 144th Street, New York, is taking bids for the construction of a four-story brick factory, 75 x 125 ft., on the west side of Rider Avenue near 144th Street, to cost about \$75,000. John Hauser, 353 West 125th Street, New York, is the architect.

The Hill Insulating & Mfg. Corporation, 511 West Forty-second Street, New York, recently incorporated with a capital stock of \$25,000 to manufacture a cast-iron spark plug, has leased a plant at its present location for three years. After this expires it will probably build a plant at some outlying point. The company will also handle mica and specialize in the production of straight and tapered tubes and complete cores. Later on it will take up the manufacture of other automobile and aeroplane accessories. Robert R. Hill is president, T. H. Thorne, vice-president; Charles G. Vogell, secretary and B. T. Hill, treasurer.

The Buffalo Metal Goods Company, manufacturer of coaster brakes, screw machine products, etc., 184 Winchester Avenue, Buffalo, N. Y., is taking bids for the construction of a two-story factory and office building, 40 x 55 ft., to cost about \$10,000. It is also adding to its machine shop an extension 27 x 45 ft., and will in a few days break ground for a hardening building. Its main plant is now 105 x 170 ft., and the additions are planned to increase its capacity. Cyrus K. Porter, 73 West Eagle Street, Buffalo, is the architect.

The Gehnrich Indirect Heat Oven Company, 60 Franklin Avenue, Brooklyn, N. Y., at the last meeting of its board of directors voted to purchase a site 100 x 200 ft., in Long Island City, on which it will erect a three-story factory. Plans are now being drawn and the construction work will start shortly. The new plant is made necessary on account of an increased demand which its present plant could not take care of. Charles L. Gehnrich is vice-president.

The Maydrite Machinery Mfg. Company has been incorporated with a capital stock of \$50,000 by John C. Delatash, 562 Newark Avenue, and others, and has established a plant at 310 Bergen Avenue, Jersey City, N. J., for the manufacture of machinery and machine products. John C. Delatash is president.

The Ford Motor Company, Detroit, Mich., has awarded contract to George P. Kelly, 20 John Street, Yonkers, N. Y., for the construction of a four-story steel and brick service building, to be erected at South Broadway and Herriot Street, at a cost of about \$100,000.

Announcement was made July 13 that the American Locomotive Company, Schenectady, had awarded contracts for the constructing of three large buildings at the Schenectady plant to cost \$310,000. The largest will be a cylinder shop, 175 x 300 ft., to cost \$230,000 and will be constructed by Howard Bennett. The second largest will be a foundry, 100 x 175 ft., to cost \$60,000, including equipment. The third, a wing to the foundry, will be 55 x 230 ft., and will cost \$20,000. Patrick McDermott will construct the foundry and its wing.

The L. W. F. Engineering Company, 67 Sixth Street, Long Island City, N. Y., manufacturer of aeroplanes, has leased according to reports the building on Eighth Street, Third to Fourth avenues, College Point, Long Island. It leased its present plant in the Russell Building in Long Island City last January, but larger quarters are now needed.

The Lubricating Metal Company, 2 Rector Street, New York, is having plans prepared by Shape & Bready, 220 West Forty-second Street, New York, for the construction of a one-story factory, 50 x 100 ft., to be erected at Newark, James

and Van Winkle avenues, Jersey City, N. J., at a cost of about \$15,000. R. B. Austin is secretary.

The Popp Foundry Company, Rochester, N. Y., has recently taken over the plant formerly operated by the Erie Foundry, but which has been idle for two years. It will manufacture gray-iron machinery castings for the present; but later intends to produce other kinds of castings. The company is capitalized at \$10,000. Charles Popp is president; George T. Hoffman is vice-president and Charles Stewart is secretary and treasurer.

The Planographic Equipment Company, 52 Duane Street, New York, recently incorporated with a capital stock of \$75,000, plans the manufacture of web and sheet-fed offset printing presses. At present it is making only a few of its devices. Allen S. Page is manager.

The Pratt Chuck Company, Frankfort, N. Y., has let the general contract for additions to its factory, to cost \$20,000. Charles T. Pratt is president.

John A. Benschel, consulting engineer, 111 Broadway, New York, is preparing plans for a hydroelectric plant for the city of Oswego, N. Y., estimated to cost with equipment \$600,000. Thomas H. McGuinness is city clerk.

The Oneida Steel Pulley Company, Oneida, N. Y., has commenced construction of a power plant from private plans.

The Pratt & Letchworth Company, Buffalo, is building a one-story steel and brick addition to its foundry and a pattern storage building at its plant at Tonawanda Street and the New York Central Railroad.

#### Catalogs Wanted

Junius H. Stone, 50 Church Street, New York, who conducts an export and import business with Spain, France, Portugal and other countries, desires catalogs of tools suitable for equipping a large machine shop.

## Philadelphia

PHILADELPHIA, Pa., July 24, 1916.

Current reports state that Coatesville, Pa., is experiencing great difficulty because its traffic is outgrowing its railroad facilities. It is said 700 cars are held up on the Pennsylvania tracks between Coatesville and Parkesburg waiting to be transferred to the Reading for shipment to the steel town. The Reading Railroad is moving about 125 cars every 24 hr., and extra crews have been put on this work. It is also expanding its yards at Valley and Modena; but until these are completed, traffic will be congested. The Pennsylvania has no yards into the Coatesville mills, although steps have been taken whereby sidings will be run in off the main line.

The Philadelphia Brass Company, 917 Crozer Building, Philadelphia, Pa., has been incorporated with a capital stock of \$101,000 to manufacture brass rods, extruded shapes and seamless tubes. It has purchased 17 acres at Downingtown, Pa., on which it will at once erect a plant which will be operated from the start on a day and night schedule to fill orders already on hand. Henry T. Coates, Jr., is president; William E. Chickering, secretary and treasurer and Walter S. Johnston, general sales manager. The board of directors include C. C. Anthony, Lewis Bernum, H. T. Coates, Jr., J. Lloyd Coates, Carl B. Ely, E. B. McCarthy and W. S. Johnston.

The Pennsylvania Equipment Company, Coleman Building, Philadelphia, is in the market for a few billet cars of 24 or 30-in. gage to hold about 2 tons of steel and for one second-hand 10-ton Browning, four-wheel, standard gage locomotive crane of about 40 ft. boom, equipped with steel canopy top, double drum and cables and furnished with complete equipment except bucket.

The Frankford Arsenal, Philadelphia, is now working three shifts of 8 hr. each in the production of army supplies and equipment.

The Harrisburg Foundry & Machine Works, Harrisburg, Pa., has increased its bonded debt from \$300,000 to \$600,000. While no statement has been issued, it is understood the new funds will be used to pay the floating debt.

Storm damage to the extent of about \$30,000 was done to the Columbia Pipe Mills, Columbia, Pa., July 13. A number of buildings were unroofed and some of the machinery was damaged.

The Dixon Valve & Coupling Company, 19 North Seventh Street, Philadelphia, manufacturer of high-pressure couplings and valves, incorporated with a capital stock of \$25,000, has established a plant at 626 Cherry Street. Howard W. Goodall is president; Frederick B. Williamson, Jr., vice-president; Alfred W. Swartz, treasurer and William S. Feeny, secretary. It has established branch offices in New York and Baltimore.

The report recently current that the Standard Chain Company, York, Pa., has awarded contract for an addition to cost about \$60,000, is erroneous, as it is not putting up any new buildings at this time.

The Keystone Surgical Instrument Company, 912 Harrison Building, Philadelphia, incorporated with a capital stock of \$6,000, has purchased the eye, ear, nose and throat instrument business of Joseph C. Ferguson, Jr., and will continue to manufacture these specialties, including eye magnets, headlights and special operating-room lighting equipment. Smith Cecil is president and general manager.

The International Money Machine Company, Terre Haute, Ind., manufacturer of payroll, change-making and similar machines, a corporation capitalized at \$2,000,000, is planning to move its plant to Reading, Pa. A new factory is to be erected there at a cost of about \$100,000 and several hundred men will be employed. The company was brought to Reading by the Chamber of Commerce.

The Sharples Separator Company, manufacturer of dairy equipment, West Chester, Pa., states that its plant is taxed to capacity to produce current orders. It is now running day and night; but is 2400 separator orders behind, several hundred milk units and is also nearly six weeks behind in the production of its engines.

The Traylor Engineering & Mfg. Company, Allentown, Pa., manufacturer of mining and cement-making machinery, plans to erect a new building on the site of its present No. 2 shop, as soon as it has completed the extension to its No. 1 shop, so that it can move over the machine tools that are now in No. 2 shop to No. 1, a four-story warehouse and administration building. The building to replace shop No. 2 will be about 100 x 500 ft., and will be equipped with cranes and elevators to handle crushing machinery and other equipment which it will keep in stock to the value of about \$300,000.

Hoopers, Bro. & Darlington, Inc., manufacturer of carriage and automobile wheels, West Chester, Pa., which for the last four months has been operating day and night, is making additions to its works to enable it to handle its product on the day shift alone. E. S. Darlington is treasurer.

The Pusey & Jones Company, shipbuilder and manufacturer of paper-making machinery, Wilmington, Del., has recently taken contract for eight more vessels of about 300 ft. length. The Norwegian shipbuilding interests, which recently acquired this company, have in mind largely extending its facilities for both lines of its products. C. Stewart Lee is assistant to the managing director.

The Lancaster Iron Works, Inc., manufacturer of plate-metal foundry and machine work, Lancaster, Pa., is building an addition to its plant, 100 ft. long, of brick and steel, to increase its machine shop capacity. W. W. Posey is president and general manager.

The Electric Storage Battery Company, Nineteenth Street and Allegheny Avenue, Philadelphia, is having plans drawn by the William Steele & Sons Company, 1600 Arch Street, Philadelphia, for the erection of a seven-story reinforced concrete and brick factory addition, 115 x 117 ft., at a cost reported to be about \$300,000.

Haffleigh & Co., manufacturers of bone products, American and Somerset streets, Philadelphia, have awarded contract to Henry Brocklehurst, 512 West Norris Street, for the erection of a one-story reinforced concrete powerhouse, 45 x 70 ft., from plans by W. E. S. Dyer, Land Title Building, Philadelphia.

## Baltimore

BALTIMORE, MD., July 24, 1916.

The Coastwise Shipbuilding Company, Fidelity Building, Baltimore, has awarded contract to the McLean Contracting Company, Fidelity Building, for the erection of a one-story corrugated iron machine shop, 40 x 200 ft. F. L. Simon, Commerce and Water streets, Baltimore, is the engineer.

The Chemical Pigments Company, St. Helena, Md., will erect a building, 100 x 200 ft., and install equipment.

The John H. Grimes Packing Box Company, Leadenhall and Stockholm streets, Baltimore, is planning the erection of an addition to its plant.

A new power house and other improvements will be made at the municipal power plant, Front Royal, Va.

An automobile repair shop and garage will be erected at Portsmouth, Va., by Minter & Mason.

Additional electrically operated equipment will be installed at Lonaconing, Md., by the Maryland Coal Company.

The Automatic Sealing & Stamping Machine Company, 608 Keyser Building, Baltimore, has been incorporated by R. J. Gill, 609 Keyser Building; L. W. Barroll and E. O. Thomas.

## New England

BOSTON, MASS., July 24, 1916.

The National Sweeper Company, a subsidiary of the Torrington Company, Torrington, Conn., has purchased the Domestic Vacuum Cleaner Company, Worcester, Mass., and will operate the Worcester plant in connection with the Standard Company of Torrington. The Worcester firm has had a rapid growth and F. J. Quist, its founder, will remain with the business for a time. The new officers are: F. P. Weston, president; G. Q. Porter, vice-president and treasurer; F. J. Quist, assistant treasurer; A. T. Quist, clerk; directors, F. P. Weston, G. Q. Porter, J. H. Graham, William R. Reid, F. J. Quist.

The Esty Machine Company, Laconia, N. H., has been incorporated with capital stock of \$100,000 to manufacture machinery, operate water rights and generate and sell electricity. The incorporators are William Esty, George W. Shurwell, Fred F. Taylor, L. A. Dearth, Rose E. Esty and Edith H. Cate.

The Lebanon Machine Company, Lebanon, N. H., has been incorporated with capital stock of \$100,000 to conduct a general machinery and foundry business. The incorporators are Thomas P. Waterman, Thomas F. Dwyer, Arthur H. Hough, A. B. Hunt and Phil R. Hatton of Lebanon.

The Buchanan Bolt & Wire Company, Holyoke, Mass., has awarded a contract for an addition, 36 x 50 ft., two stories.

The Rockwell-Drake Company, Plainville, Conn., is pushing the erection of an addition to its plant, which has been in operation less than a year and is working now with a day and night force.

The Fire Alarm Signal Company, Boston, Mass., has been incorporated with capital stock of \$100,000. The directors are Benjamin B. Hatch, president; Alfred J. Hixon, 303 Congress Street, Boston, treasurer; and Hollis H. Sawyer.

The New Departure Mfg. Company, Bristol, Conn., is having plans drawn for a factory on Valley Street, about 300 ft. long, four stories, with ells. It will be used by the ball bearing department.

The American Graphophone Company, Bridgeport, Conn., has awarded to the Austin Company a contract for the building of an addition to its recently acquired Birdseye-Somers plant on Barnum Avenue. The new building will be 80 x 420 ft., with ells 15 x 60 ft., three stories and basement. The company is rushed with business and has been expanding its plants greatly in the past year.

The American Electric Equipment Company, 115 Broadway, New York, is having plans drawn for the rebuilding of its plant in Bridgeport, Conn.

The Bryant Electric Company, Bridgeport, Conn., has broken ground for two one-story additions, 40 x 53 ft. and 48 x 66 ft.

Norwalk, Conn., has awarded contract to the J. G. White Engineering Corporation, 43 Exchange Place, New York, for improvements to its electric light and power station.

## Chicago

CHICAGO, ILL., July 25, 1916.

The floor stocks of the local dealers in machinery are beginning to show a return of used machinery for resale. More than a sprinkling of single-purpose lathes may be found. In view of the fact that there has been a marked increase in the sizes on shells demanded, requiring much heavier tools for their manufacture than were called for by the earlier shrapnel contracts, the disposition of these used tools now coming in the market becomes a problem, unless further shrapnel orders are to be placed. A report is current that a large order for 3-in. shells has just been closed in Canada. Within the last few days two large contracts for 9.2-in. shells have been closed and others are pending for 12-in. and 16-in. high-explosive shells. An order was placed this week for 100 heavy lathes for 9-in. and 12-in. shells and one lot of 300 additional lathes is before the market. Inquiry is also noted for twelve 36-in. heavy-duty engine lathes. In the normal lines of business no great activity is apparent. Manufacturers of certain lines of tools, including a number of makes of lathes, are finding themselves in position to quote fairly prompt deliveries. In a few instances manufacturers are again putting machines into stock. These conditions are still in contrast to deliveries quotable on other standard lines which run in some cases as far ahead at March, 1917.

The Sanitary Wire Door Mat Company, Chicago, has been organized with a capital of \$2,500 by James A. Flinn, E. M. Dowd and Albert N. Charles, 155 North Clark Street, Chicago.

The Sherwin-Williams Company, Chicago, has awarded contracts for the erection of a one-story factory addition at its Kensington plant.



The Acme Packing Company, Chicago, has recently purchased property on which it plans to erect a new plant, involving an expenditure of \$250,000.

The Schultz Ball Bearing Company, Chicago, has filed a petition for a charter authorizing a capital of \$50,000. The company may be addressed in care of H. F. Tucker, Otis Building, Chicago.

Norgaard & Christensen, 1616 North Campbell Avenue, Chicago, doing an automobile repairing business, will build a one-story machine shop, 50 x 100 ft., to cost \$10,000.

The Excelsior Steel Furnace Company, 517 West Monroe Street, Chicago, Arthur W. Glessner president, is having plans prepared in the office of F. E. Davidson, architect, for its proposed plant to be erected at a cost of \$150,000.

The Metal Specialties Mfg. Company, L. W. Golder, secretary, 736 West Monroe Street, Chicago, is planning to erect a four-story factory, 100 x 140 ft., to cost about \$75,000.

F. W. Patterson, a dealer in automobiles, 834 East Forty-third Street, Chicago, will build a one-story garage, 60 x 150 ft., to cost \$18,000.

Plans for the new Pullman Free School of Manual Training now include the erection of a two-story foundry and forge shop, 47 x 115 ft. These shops are expected to cost \$25,000. The architect is C. F. Jobson, 79 East Adams Street, Chicago, and Dr. L. V. Weld is principal of the school.

The Decatur Pump & Mfg. Company, Decatur, Ill., has been organized with a capital of \$15,000 by H. C. Burks, A. W. Burks and M. M. Myers.

The Gibson Brothers Mfg. Company, Waukegan, Ill., has awarded the contract for a small addition to its plant.

A controlling interest in the Peerless Machine Works, Freeport, Ill., has been acquired by H. L. Bering, and it is the ultimate plan to move the plant to Decatur, Ill. This change has been delayed because of the excellent volume of business now being handled by the company.

The Comstock Mfg. Company, Evanston, Ill., has been incorporated with a capital of \$10,000 by W. A. Bockius, Wilmette, Ill., E. J. Clappitt and H. M. Byall. It will manufacture air compressors and other machinery.

The Hercules Porcelain Company is building a plant at Belvidere, Ill., for the treatment of clays for the manufacture of insulating devices, including automobile spark plugs. The company was organized by William S. Brown, Sr.

The Illinois Corrugated Metal Company, Bloomington, Ill., sheet-metal manufacturer, will move its plant to Springfield, Ill., where it will occupy the plant formerly operated by the Gibson Gear Company.

The American Protective Pole Company, Freeport, Ill., has been organized with a capital of \$50,000 to manufacture iron and sheet-metal specialties by S. M. Molinix, J. W. Stocks and W. M. Arnold.

A new corporation, known as the Kelsey Wheel Company, has been incorporated with \$3,000,000 preferred and \$10,000,000 common stock. It will absorb the Kelsey Wheel Company of Michigan, the Herbert Mfg. Company of Michigan, the Kelsey Wheel Company of Tennessee and a company of the same name located in Canada. These firms manufacture automobile wheels, doing a business in 1915 of \$5,227,523 and of \$3,949,222 in the first six months this year, according to a statement issued recently by officers of the company. John Kelsey is president.

The Holihan Mfg. Company, manufacturer of hoods, tanks and other sheet-metal stampings, Twenty-first Street and West Jefferson Avenue, Detroit, Mich., has purchased 3½ acres at Milford Avenue and the Pere Marquette Railroad at a cost of about \$20,000. It has broken ground for a plant, 80 x 400 ft., which will give it double its present manufacturing space. The company's business has doubled since 1915. William Christian is secretary and general manager.

The Western Crucible Steel Casting Company, Minneapolis, Minn., advises that in connection with its plant improvements it will spend at least \$100,000. Its new building will be 90 x 255 ft., and there will be installed a two-ton Snyder electric furnace, a 5-ton Pawling & Harnischfeger crane, a Milwaukee sprue cutter, new tumbling barrels, a Pangborn sand blast air hoist and electric elevator. It is expected that the new plant will be ready for operation by the middle of October. G. T. Honstain is president and W. J. Milne, vice-president and general manager.

The Mayer Brothers Mfg. Company, Mankato, Minn., will build a one-story reinforced concrete factory, 100 x 400 ft.

Wernette, Bradfield & Mead, architects, Grand Rapids, Mich., are preparing plans for a factory, 60 x 350 ft., for the Piqua Handle Mfg. Company, to be located at Marquette, Mich.

## Cleveland

CLEVELAND, OHIO, July 24, 1916.

New inquiries are more plentiful than for some time. One maker of automobile parts is in the market for about 75 machines and several other inquiries are for a dozen or more machine tools. One of these inquiries is for a number of machines for making shell parts. A particularly active demand is encountered for small lathes in 16 and 18 in. sizes. Dealers say that considerable prospective business is being held up because of high prices. In spite of the heavy movement of second-hand machinery a few months ago, a moderate amount of used machinery is coming on the market and is finding ready sale.

The Foundry Equipment Company, Cleveland, which has succeeded the Coleman Foundry Equipment Company, plans to establish a new plant in much larger quarters and will build core ovens and other foundry equipment. Much of this has heretofore been made for the company in other plants. The Foundry Equipment Company has just been incorporated with a capital stock of \$10,000. The president is James Tuteur, formerly president of the Columbian Hardware Company, Duplex Hanger Company and the Republic Structural Iron Works Company, Cleveland, who purchased the plant of the Coleman Foundry Equipment Company. F. A. Coleman, former president, remains as general manager. The company reports the recent taking of a number of orders for foundry equipment, among these being orders from the Otis Steel Company, Cleveland; Johnson Bronze Company, New Castle, Pa.; Gleason Works, Rochester, N. Y.; Otis Elevator Company, Harrison, N. J., and the Kokomo Glass Company, Kokomo, Ind.

Orders for factory buildings aggregating \$526,000 have been taken by the Austin Company, industrial builders, Cleveland, during the past two weeks. Most of these are for industrial buildings of standard design for quick delivery. These include a building for the Ohio Seamless Tube Company, Shelby, Ohio, to cost \$125,000, and providing 110,000 sq. ft. of floor space for making tubing; a one-story building, 158 x 208 ft., for the Elyria Iron & Steel Company, Cleveland, for making oxy-acetylene welded steel tubing, costing \$75,000; a factory extension for the Torbenson Gear & Axle Company, Cleveland, for making automobile truck axles, costing \$16,000; a building for the Turner, Vaughan & Taylor Company, Cuyahoga Falls, Ohio, to cost \$20,000; a building for the Jackson Welding Company, Jackson, Mich., for making automobile parts to cost \$75,000; a standard building 300 ft. long for Robert Hassler, Indianapolis, Ind., costing \$45,000, for making shock absorbers; a building for the American Graphophone Company, Bridgeport, Conn., to cost \$150,000, and a building, 60 x 225 ft., for Harrison Brothers, Philadelphia, Pa., to cost \$20,000.

The Ohio Crane Company, Bucyrus, Ohio, has been incorporated with a capital stock of \$200,000 and has acquired the plant of the Bucyrus Forge & Machine Company, which includes a building 42 x 115 ft. Plans are being prepared for additional buildings that will include a machine and erecting shop, 90 x 400 ft., a structural and forge shop, 50 x 150 ft., and a power house and office building. The new company will manufacture locomotive cranes for the Ohio Locomotive Crane Company of Bucyrus. At present the latter company's cranes are being built by the Carroll Foundry & Machine Company.

The Fulton Tool Works, Canal Fulton, Ohio, has passed into the hands of the Fulton Tool Company, Huntington, W. Va. The plant will be operated for a number of weeks until a new plant under way in Huntington is completed. The products of the Fulton Tool Works include miners' picks, shovels, supplies, etc. Practically the same products will be made in the West Virginia plant. The officers of the new company are C. C. Hartzell, president and general manager; J. L. Hawkins, vice-president, and A. C. Bastianelli, secretary and treasurer.

The Baxter Stove Company, Mansfield, Ohio, announces that it will close down its plant and discontinue business shortly for the reason that John L. and Edwin D. Baxter, the two remaining owners of six brothers that started in business in 1883, wish to retire from active business. The plant equipment will be offered for sale. The products of the plant are stoves and ranges.

The plant of the United Electric Company in New Philadelphia, Ohio, will shortly be moved to the main works in Canton, Ohio. This plant was formerly operated by the Wise-Harold Electric Company and was taken over by the United Electric Company several months ago.

The American Stove Company has completed plans for a factory addition in Cleveland. This will include a four-story brick warehouse and a one-story factory building, 125 x 320 ft.

G. M. McLaren, president of the McLaren Iron Works,

Cleveland, has taken bids for a one-story factory and office building, 60 x 200 ft.

The Ohio Corrugating Company, Warren, Ohio, manufacturer of roofing, ceiling and other sheet-metal products, is contemplating the erection of a sheet mill, but advises that it has not yet decided on definite plans.

The Scanlon Machine Company, Toledo, Ohio, has been incorporated with a capital stock of \$10,000. William Wilmington, Julian H. Tyler and L. G. Gardner are stockholders.

The Houghton Malleable Castings Company, Toledo, has been incorporated with a capital stock of \$100,000. R. L. Houghton and Rupert Holland and others are the incorporators.

The Ohio Corrugating Company, Warren, Ohio, has increased its capital stock from \$50,000 to \$100,000.

The Defiance Screw Machine Products Company, Defiance, Ohio, will erect a one-story building for storage purposes.

The Urbana Tool & Die Company, Urbana, Ohio, has under consideration the erection of a factory extension.

The American Fork & Hoe Company has under way extensive improvements to its Ashtabula plant, including the erection of a forge shop and a powerhouse.

The Hester Tire & Rubber Company, Lima, Ohio, has acquired a three-acre site on which it will shortly begin the erection of a building, 60 x 150 ft., and a powerhouse.

## Indianapolis

INDIANAPOLIS, IND., July 24, 1916.

The Campbell Folding Car Step Company, Indianapolis, has been incorporated with \$50,000 capital stock to manufacture folding car steps. The directors are Nelson J. Carr, W. J. Wilson and Socrates A. Campbell.

The Ponton Mfg. Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture extensible braces and machinery. Arthur, Alford and P. Ponton are the directors.

E. C. Atkins & Co., saw manufacturers, Indianapolis, are erecting a three-story brick, steel and reinforced concrete addition, 40 x 190 ft., to their plant. It will be used as a forging department and will cost \$30,000.

Robert H. Hassler, Indianapolis, manufacturer of automobile accessories, will erect a new building at 1585 Naomi Street to cost \$44,000.

The Link-Belt Company, Indianapolis, will erect an addition to its foundry to cost \$20,000.

The Briant Mfg. Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture novelties, etc. The directors are George A. Bittler, Mark E. Archer and Isaac A. Lewis.

The plant of the Westcott Motor Car Company, Richmond, Ind., has been moved to Springfield, Ohio, and the buildings will be taken by the Davis Motor Car Company as an extension to its plant.

The Brosche & Kenley Twentieth Century Supply Company, Attica, Ind., has been incorporated with \$75,000 capital stock. Charles T. Jacobson is manager.

The New Idea Mfg. Company, Crawfordsville, Ind., has been incorporated with \$5,000 capital stock to manufacture crates. The directors are Robert C. Smith, Charles A. Westfall and Albert E. Harris.

The Hercules Buggy Company, Evansville, Ind., will build an addition to its plant, 80 x 120 ft., to cost \$20,000. John D. Craft is vice-president.

The Owens Bottling & Machine Company, Toledo, Ohio, has bought the Graham Glass Company, Evansville, Ind., and its two other plants, for \$1,000,000.

The Richmond Industrial Development Company, Richmond, Ind., has been organized to develop the industrial interests of the city. The directors are George H. Eggemeyer, George H. Knollenberg and J. M. Lontz.

The Commercial Club, Winchester, Ind., has raised \$8,000 to buy stock in the S. J. Beebe Stove Works, capitalized at \$15,000. Option on a site for the plant has been taken.

The Fort Wayne Corrugated Paper Company, Fort Wayne, Ind., has increased its capital stock from \$1,000,000 to \$1,500,000.

The International Steel & Iron Company, manufacturer of architectural iron work, store fronts, etc., Evansville, Ind., has completed its new planing mill, of frame and steel construction, 50 x 150 ft., and a lumber shed, 30 x 100 ft., costing together about \$10,000. It has finished erecting a structural shop, 140 x 385 ft., at a cost of about \$75,000. This building is equipped with an electric crane of 75-ft. span. The sides of the plant are 32½-ft. bays used for architectural iron.

## Milwaukee

MILWAUKEE, WIS., July 24, 1916.

The production of machine tools in the Milwaukee district has not yet been affected by the strike of machinists, the walkouts not having reached this particular line of the metal-working industry. All available capacity is still well occupied. New business is nearer normal than since the revival of buying months ago. Gas engine and automobile shops are the best buyers of milling tools, lathes and drills. A period of two weeks of torrid weather has caused some lassitude in production and trade. Complaints are still heard that the high price of building materials—steel as well as others—is precluding numerous important new construction projects which, if erected, would require considerable miscellaneous machinery and tools. A feature of the situation throughout Wisconsin is the continuance of the establishment of new garages, with machine and repair shops. These projects take up considerable of the used tools of the smaller and lighter types, and in some instances the equipment includes large lathes. The condition is doubtless due to the fact that already there have been licensed in Wisconsin 105,000 privately owned motor vehicles, an increase of 25,000 over last year's total figures. So far the used tool market in Milwaukee has not received a surfeit of machines, and the dumping reported in the East is not apparent here. A good market for second-hand tools is had and stocks are kept cleaned up. Buyers are discriminating, however, and will not take machines that ought to be scrapped. Prices are well maintained, but attractive.

A report from Sheboygan Falls, Wis., states that the Falls Machine Company, of that city, manufacturer of automobile engines, has passed into the control of a syndicate represented by Andrews & Co., bankers, of Chicago. It is stated that the company will be re-incorporated under the style of the Falls Motors Company, under the laws of Virginia, with \$1,500,000 capital.

The Manitowoc Dry Dock & Shipbuilding Company and the Manitowoc Boiler Works Company, Manitowoc, Wis., have been consolidated as to ownership, but will be operated as separate institutions, the names having been changed to the Manitowoc Shipbuilding Company and the Manitowoc Boiler Works respectively. E. E. Gunnell continues as general manager of the shipyards and C. C. West of the boiler plant. Arrangements have already been made to increase the size of the boiler works 25 per cent. This contract has been placed with the Wisconsin Bridge & Iron Company, Milwaukee. The machinery and equipment are now being ordered. The two plants now employ over 1200 men.

The Rotary Gas Engine & Pulverizer Company, Antigo, Wis., the incorporation of which was noted, has contracted for the production of its devices and machines with Mayer Brothers, who recently took over the former International Holst Company works and are operating a commercial foundry and machine shop. The arrangement is temporary and later the Rotary Company will build a plant of its own. Its products include rotary gas and steam engines, clod crushers, subsurface packers, mulchers, rotary pulverizers, farm tractors, automobile chassis, transmissions and similar equipment. Clarence Rishel, who went to Antigo from Denver, Col., is mechanical engineer.

The Mohr Lumber Company, Wausau, Wis., is preparing to rebuild its sawmill destroyed by fire with a loss of \$75,000. C. F. Mohr is president.

The Continental Motor Truck Company, Superior, Wis., has broken ground for its new manufacturing plant on Belknap Street and the Soo Line tracks to cost \$50,000. Occupancy will be taken about Sept. 1. All of the equipment of the present works in leased quarters will be utilized; but a list of new tools will be purchased. J. G. Barnsdale is secretary.

Platteville, Wis., will build a high school at a cost not to exceed \$100,000, with a complete manual training equipment.

H. C. Biddison, Madison, Wis., who has been manufacturing lubricating and general machinery appliances in leased quarters at 1516 Williamson Street for many years, is having plans prepared for a machine shop at Williamson and Rogers streets, of brick and concrete, one-story, 44 x 60 ft.

The Commonwealth Power Company, Milwaukee, has disposed of its entire holdings to the Milwaukee Electric Railway & Light Company for \$1,100,000.

The Baldwin Co-Operative Creamery Association, Baldwin, Wis., is preparing to expend \$50,000 for a new dairying plant, to contain a large refrigerating unit. John Nymon is manager.

The Rhinelander Paper Company, Rhinelander, Wis., is making extensive improvements in its mill, and also intends to build a sulphite plant and tower, expending about \$100,000 in improvements. John Van Alstyne is general superintendent.



James Evans, Madison, Wis., is having plans prepared for a garage at Henry and Dayton streets, of brick and steel, 66 x 198 ft., two stories and basement.

The Terrio Mfg. Company, Waupaca, Wis., organized recently, will establish a factory for the production of butter testers, egg-candling machines, etc. Quarters will be leased for the present.

Edwin J. Terwilliger, Clinton, Wis., has purchased the machine and automobile repair shop of the Terwilliger Garage Company, and will do a commercial machinery business. A few pieces of new equipment will be installed.

The Wisconsin Foundry & Steel Works, Cedar Grove, Wis., at a special meeting of stockholders, decided to change its corporate style to the Cedar Grove Stove Company, to better express the nature of its business.

The Flach & Schneeberg Company, Milwaukee, operating a machine shop at 764 Thirty-second Street, has filed a voluntary petition in bankruptcy. The assets are listed at \$6,396 and liabilities at \$3,172. The creditors will meet July 28.

G. O. Bergland, Deerfield, Wis., will establish a small factory for the manufacture of a new type of concrete mixer for small jobs.

The Overland-Madison Company, Madison, Wis., western Wisconsin automobile agent, will spend \$15,000 to \$20,000 in erecting a garage, warehouse and repair shop, 66 x 80 ft., at East Wilson and King streets, Madison. It will be three stories and basement. R. A. Warner and J. Parker Gillespie are managers.

H. W. Forsyth, S. R. Deakin and H. R. Clough, all of Milwaukee, have organized the Spring Power Machinery Company, with a capital stock of \$50,000. Plans are not quite matured.

Byron Scheiderer, architect, Milwaukee, is taking bids this week on important additions to the garage and machine shop of Warren Brothers, State Street, Wauwatosa, Wis. A second story, 54 x 144 ft., will be added, and an extension, 40 x 40 ft., will be built to the machine shop.

The C. H. Armiger Chemical Company, Milwaukee, awarded the general contract for a fireproof addition, 75 x 130 ft., to its plant at 770 Greenbush Street, to the Northern Construction Company, Milwaukee.

The Lake Superior Electrical Company, Lamborn and Third streets, Superior, Wis., recently incorporated with a capital stock of \$50,000, has taken out a building permit for the construction of a factory at Grand Avenue and Third Street to cost about \$7,000. It will manufacture a flashlight and an electric whistle, employing about 25 men at the start.

## Cincinnati

CINCINNATI, OHIO, July 24, 1916.

Second-hand machine tools have not been offered in this market by nearby manufacturers. In fact, munition makers, who have recently taken on additional contracts, have lately placed orders for new lathes, and are not offering to sell more than the usual number of used machines. Auto-truck manufacturers, who are very busy, are quietly buying single tools, but are not issuing any lists. Business from the railroads is still disappointing. With the exception of Canada, the export demand for machine tools is limited, although quite a number of machines are still being shipped to Europe on old contracts. Some new business has lately been received from the Pacific coast.

Full details are not yet available as to the plans of the Pfau Mfg. Company, Cincinnati, but it is currently reported that the company will erect a large addition to its plant in Norwood for the manufacture of sanitary pottery.

It is rumored that the United States Cast Iron Pipe & Foundry Company is having plans prepared for doubling the capacity of its plant at Addyston, Ohio, a Cincinnati suburb.

The Carlton Machine Tool Company, Cincinnati, Jack C. Carlton, president, has acquired a site adjoining its plant in West End, and will soon commence the construction of a large addition. The company recently acquired the plant of the W. E. Gang Company.

The Domestic Engineering Company, Dayton, Ohio, has let contract for a new plant to be constructed in a Dayton suburb that will be used for the manufacture of farm lighting outfits. The new building will be 270 x 1000 ft., of sawtooth construction and when completed will cover more ground space than any one manufacturing building in that vicinity. A large amount of machinery will be required.

The Safety Emery Wheel Company, Springfield, Ohio, is preparing plans for an addition to its plant that will be completed before the winter season. The company now has under construction an office addition.

The National Mortar & Supply Company, Springfield, Ohio,

has commenced the reconstruction of the recently acquired plant of the Cold Springs Lime & Stone Company, located near Springfield. It is reported that 10 new kilns will be erected together with a hydrating plant.

The Urbana Packing Company, Urbana, Ohio, has commenced construction of an addition to its plant for which refrigerating equipment will be required.

The Hercules Buggy Company, Evansville, Ind., will soon begin work on an addition to its plant that will be 80 x 120 ft., three stories and of brick construction.

## St. Louis

ST. LOUIS, MO., July 24, 1916.

Machine-tool demand continues satisfactory and the aggregate of orders is quite equal to the ability to deliver. Pressure for delivery has about disappeared and the business is regaining a normal state. No pressure of second-hand tools has been felt here as a result of the completion of munitions contracts elsewhere. No premiums are being paid for machinery. Reports from all parts of the St. Louis territory are of excellent business conditions and also of fine crops.

The Laclede Iron Works, St. Louis, Andrew J. Franz manager, has leased additional space at 1315 Chestnut Street, and will increase its equipment for the manufacture of ornamental iron, etc.

The Light & Development Company, St. Louis, Mo., has increased its capital stock from \$1,500,000 to \$3,000,000 for the purpose of acquiring new plants and extending equipment of its existing plants, chiefly electric plants and waterworks.

The General Explosives Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000, to be increased later, and will manufacture explosives and shells. The stockholders are E. William Hawley, Railway Exchange Building, St. Louis; Walter W. Edwards and Joseph M. Owne, of Chicago, and Alfred J. Rawlings, New York.

The Richardson Hardware Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by Carl N. Richardson, D. Murray Foley and J. Carter Carstens to manufacture hardware specialties.

The Knox Furnace & Cornice Company, St. Louis, Mo., has leased quarters at 4414 Easton Avenue, and will increase its plant capacity.

The Ford-Davis Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of \$30,000 by E. W. Oelfken, W. C. Kleine, George H. Allan, T. D. Davis and James J. Masterson to manufacture metal products, including piston rings, etc.

The Davis-O'Fallon Equipment Company, St. Louis, Mo., has been incorporated with a nominal capital stock of \$10,000 by John J. O'Fallon, Jr., William H. Davis and others to manufacture railway equipment and supplies.

The branch of the American Express Company, at St. Louis, Mo., N. T. Brown superintendent, will erect a garage and machine shop for its vehicles. The Wells-Fargo Company at St. Louis will also equip a garage and machine shop under the direction of its superintendent, Grover B. Simpson.

The plant of the Rogers Foundry & Mfg. Company, Joplin, Mo., was recently damaged by fire to the extent of \$65,000.

A branch assembling plant, machine shop and garage to cost about \$50,000 will be equipped at East St. Louis, Ill., by the Ford Motor Company, Detroit, Mich.

The Kansas City Fan & Motor Company, Kansas City, Mo., has been incorporated with a capital stock of \$12,000 by H. C. Hoffman, David E. Long and Alden W. Burke to manufacture electric fans, etc.

The West Side Machine Shop Company, Webb City, Mo., has been incorporated with a capital stock of \$22,000 by J. C. Coffee, L. E. Sweetland and Charles Jaccard to do a general machine business and to manufacture tools.

The Gille Mfg. Company, Kansas City, Mo., has acquired a seven-story building at Ninth and Liberty streets, and will equip a plant for the manufacture of tinware, cans and metal containers.

The Stuttgart Public Service Company, Stuttgart, Ark., has been incorporated with a capital stock of \$150,000 by F. G. Frouitt, T. H. Rhodes and William A. Smith to equip a waterworks, an electric light plant, etc.

L. K. Brown and others, Grinkley, Ark., will install equipment for a four-saw, 80-stand cotton gin.

The Farmers' Gin & Mfg. Company, Round Pond, Ark., has been incorporated with a capital stock of \$17,500 by John Mosely, John Mallory and Charles Fleming and others.

The Sawyer Gin Company, Sawyer, Okla., has been incorporated with a capital stock of \$15,000 by J. D. Moore, J. W. Robinson and J. A. Deavours and others.

The Marion Refinery Company, Claremore, Okla., has

been incorporated with a capital stock of \$250,000 by G. W. Fry of Claremore, A. S. Nelson of Muskogee, Okla., and A. M. White of McKinney, Tex.

The Brenton Oil & Gas Company, G. B. Stone president, Colcord Building, Oklahoma City, Okla., will equip a pipe line and install pumping machinery, etc. W. C. Burke is engineer.

The Millikin Company, Tulsa, Okla., has been incorporated with a capital stock of \$1,000,000 by W. T. Millikin and others to equip an oil refinery. Guy Forcier is manager.

The Sinclair Pipe Line Company, Tulsa, Okla., a subsidiary of the Sinclair Oil and Refining Corporation, will equip a pipe line from Tulsa to Chicago, Ill., and is in the market for the necessary pumping equipment as well as piping, etc.

The Pierce-Fordyce Oil Corporation, St. Louis, Mo., will equip a pipe line from Tulsa, Okla., to a refinery in Texas, and is reported in the market for the pumps, piping, etc.

H. W. Hartsaw and others of Bristow, Okla., have organized a company with \$100,000 capital for the manufacture of lightning arresters for oil tanks, etc.

The Valley Motor Company, Pauls Valley, Okla., has been incorporated with a capital stock of \$15,000 by R. C. Baird, Pearl Baird and E. O. Tribbey of Purcell, Okla., and will equip a machine shop and garage. They will also equip a similar plant at Purcell under the corporate title of the Baird Motor Company.

The New Orleans Refinery Company, New Orleans, La., in care of the Rosenberg-Rowan Company, will equip an oil refinery above New Orleans. The company is controlled by the Royal Dutch Shell Corporation, Tulsa, Okla.

## The Central South

LOUISVILLE, KY., July 24, 1916.

Statements of a slackening in industrial operations are not borne out by reports from the iron, steel and machinery trades in this section. The usual mid-summer lull is conspicuously absent. Labor shortage is expected to have some influence on the trade, and an increased demand for labor saving machinery is looked for. Coal operators particularly are seeking means of increasing their working capacity by adding to their machinery equipment.

The Norton-Caldwell Company, Louisville, has purchased property at Third and Breckenridge streets, and it is reported contemplates erecting a garage to cost \$18,000.

J. J. Gaffney, architect, Louisville, has purchased a lot 146 x 160 ft., on Guthrie Street, and will erect a two-story garage at an estimated cost of \$50,000, for W. A. Thomas.

The Callahan-Whiteside Motors Company, Louisville, has been incorporated with \$20,000 capitalization to do a general garage business. The incorporators are William P. Callahan, Addison H. Whiteside, Benjamin H. Radebaugh.

The plant of the Sherrill-King Lumber Company, Paducah, Ky., has been taken over by C. H. and Fain King, to be operated as the King Mill & Lumber Company.

M. L. Forrest, J. H. Ford and Harry Ford are erecting a canning factory at Sedalia, Ky., to have a capacity of 12,000 cans daily.

The Ashland Iron & Mining Company, Ashland, Ky., is completing construction of its new machine shop, 120 x 260 ft.

Winchester, Ky., will seek permission to utilize the water power in connection with the flow over the Government dam in the Kentucky River. It is stated that the power would be sufficient to operate a municipal water system pumping station. The mayor may be addressed.

John T. Livingston, Lancaster, Ky., is making plans for the manufacture of a special automobile fender.

H. A. Williams, John R. Burrows, and others, have incorporated the Brown Chemical Company, Nashville, Tenn.

Elrod & Co., Erwin, Tenn., are in the market for a molder for planing two sides of automobile blank spokes, a 24-in. DeLance automobile spoke lathe; rip table and a short log mill for rim strips, all second hand.

The Southern Coffin & Casket Company, Maryville, Tenn., has increased its capital to \$90,000.

The Mascot Stove Company, with Sewell Howard, Harry Howard, Polk Tarwater, Fred G. Haggard, and others, Chattanooga, Tenn., will organize a stove manufacturing plant to have \$50,000 capital at Rockwood, Tenn. J. G. F. James, general manager of the Mascot plant, will manage the new enterprise.

The Womble Storage Battery Company has equipped a plant at 204 Market Street, Chattanooga, Tenn., to manufacture storage batteries.

## Texas

AUSTIN, TEX., July 22, 1916.

The excessively hot weather the last week has tended to put dullness into the machinery and tool trade. The demand for cotton ginning machinery continues good. Crop prospects are satisfactory in every respect. New cotton is beginning to come in and high prices are paid for the staple.

The Texas Company, 17 Battery Place, New York, has purchased a tract of 29 acres, adjoining the International & Great Northern Railroad at Houston, upon which it will build general machine shops for its oil-well and transportation equipment.

The Bay City Products Company, Bay City, which has a capital stock of \$25,000, will operate a plant for the manufacture of tile, brick and other clay products. J. W. Rugeley is one of the promoters.

W. A. Bonenmann & Co., Manor, will build a cotton gin at a cost of about \$15,000. William Bauer, Sr., is in charge.

The Robstown Gin & Ice Company, Robstown, will build a cotton gin and ice plant at a cost of about \$60,000.

C. Knipstein & Co., Burton, will build a cotton gin to cost about \$12,000.

The Texas Wheel & Body Company, Dallas, has just finished the erection of a new factory. It manufactures wheels and bodies for vehicles. R. F. Robinson is president.

It is reported that the Atchison, Topeka & Santa Fe Railroad plans to remove its general shops from Needles to Seligman, Ariz.

The Scott-Fulton Mfg. Company, El Paso, plans to install a plant for manufacturing a patent fly trap.

T. L. Moss & Co., Bomarton, will build a grist mill and cotton gin at a cost of about \$14,000. T. L. Moss is a stockholder.

## Birmingham

BIRMINGHAM, ALA., July 24, 1916.

Leading wholesale machinery interests report business as more and more slack with the passage of the past month. Gasoline engines and pumps, recently in demand incident to the excessive rains and floods, are the only items on the active list. Deliveries are easier than in some time. Low prices in the lumber trade and the prior rush of activity by many small plants, thus increasing the supply and tending to price softening, have had a marked effect in that direction. High prices of finished materials have stopped structural work of many kinds.

J. A. Powers, Atlanta, and associates have purchased 4000 acres of timber lands near Baxley, Ga., for \$60,000, and will cut the timber.

The Gas Engineering Company, West Palm Beach, Fla., will establish an ice and cold storage plant. Frank D. Moses, Trenton, N. J., is president.

G. H. Wood, president of the River Basin Paper Company, and George R. Wright, vice-president of the Louisiana Fibre Board Company, Bogalusa, La., are negotiating with the citizens of Hattiesburg, Miss., who have offered a free site for the location of a wood fiber plant to cost \$750,000.

Columbia, S. C., is planning extensions of its waterworks and sewer systems at a cost of \$350,000. Bonds were recently voted.

## San Francisco

SAN FRANCISCO, CAL., July 18, 1916.

The machine-tool trade is brisk and many buyers are placing orders for distant deliveries. Inquiries on hand indicate still greater activity as shipments become normal. Country garage equipment is in especially strong demand, and second-hand tools are eagerly sought. Improvements to shipbuilding plants are proceeding rapidly. Traction engine manufacturers are working on some war orders, in addition to a heavy domestic trade. Exports of gas engines are large, especially to Australia. Several substantial orders have been placed for industrial railway equipment.

The Gorham Engineering Company, Oakland, specializing in gas engines, is developing a line of aeroplane engines. A small foundry has been installed for aluminum and bronze castings.

It is reported that the Aluminum Products Company, Chicago, has purchased a factory site at Third Avenue and East Eleventh Street, Oakland.

The C. L. Best Gas Traction Company has decided to locate its new plant at San Leandro, Cal., a short distance from its old establishment.



The Union Iron Works has laid foundations for the new shop at its Alameda plant, formerly the United Engineering Works, the building to be 600 ft. long. Three large traveling cranes will be in operation within a week, and an industrial railroad is being installed in the yards.

The Golden West Motors Company, Sacramento, Cal., has been reorganized, and arrangements are under way for the resumption of the manufacture of motor trucks.

The E. H. Moyle Engineering & Equipment Company, Los Angeles, has moved to 508 East Ninth Street, and is installing machinery to manufacture crushers and stamp mills.

The San Pedro Marine Engine Works, operated by W. M. Parke and Samuel Mills, has secured a permit for the use of a tide-land site at Los Angeles Harbor for marine engine and repair shops.

The Western States Gas & Electric Company is making a large addition to its hydroelectric plant near Junction City, Trinity County, Cal.

George I. Gardner and W. B. August, Stockton, Cal., have opened a foundry in the plant formerly occupied by the Globe Iron Works.

The Mechanical Educator Company, Los Angeles, plans to build a factory, the equipment of which is estimated to cost about \$4,000. W. B. Farr is president.

## The Pacific Northwest

SEATTLE, WASH., July 18, 1916.

Statistics for the first six months of 1916, show that water shipment from Seattle amounted to \$194,725,533, or practically double that for the same period of last year. This is regarded as a remarkable figure, as Seattle ports have been almost demoralized by strikes among waterfront workers for the past month. At present, shipping is carried on under the greatest difficulty—all the union workmen in Tacoma and Seattle are on strike, and cargo shipments are greatly hampered. Added to this is the continued scarcity of tonnage.

The mid-summer repairing season and consequent shutdown of practically all the lumber camps and mills in the Pacific Northwest has resulted in a curtailment of production of fifty per cent, but the fall season is expected to open on a sound basis.

The Neubert & Weber Mfg. Company, Seattle, has been incorporated for \$10,000, and plans the establishment of a factory to manufacture store fixtures.

Equipment and machinery in the plant of the Union Iron Works, Spokane, Wash., was damaged to the extent of \$3500 in a recent electrical storm.

The Kenney Economy Hydraulic Company, Vancouver, Wash., has been incorporated for \$250,000, and has completed plans for the construction of a plant to manufacture hydraulic stump pulling and splitting machines and other apparatus. Frank E. Kenney, Portland, is president, and other incorporators are D. W. Hoebing, John F. Shorey and George B. Simpson. The company reports orders approximating \$200,000 are now booked, and the plant will be rushed to completion.

Plans have been completed for the two-story addition, 45 x 60 ft., to the plant of the Clark-Wilson Lumber Company at Linnton, Ore. Work will start immediately.

The sash and door factory of W. G. Scrim & Co., Vancouver, B. C., was recently destroyed by fire with a loss of \$9,000.

The North Pacific Shipbuilding Company, Portland, Ore., has been incorporated for \$100,000, with F. A. Ballin, president; R. A. Purdy, vice-president, and J. B. C. Lockwood, treasurer. It plans the immediate construction of a plant in Portland to build composite cargo steamers of 5000 tons capacity. The vessels will handle 4,000,000 ft. of lumber, and will be 346 ft. long, with 50-ft beam. The company will work in conjunction with the Smith & Watson Iron Works and the Northwest Steel Works, where the machinery for the steamers will be built. Plans for the plant are being prepared, and construction work will be rushed.

C. E. Warwick, Anaconda, Mont., plans the installation of an electric lighting plant in Whitetail, Mont., to supply that city and surrounding territory.

The Elliott Bay Ship & Engine Company, Seattle, Wash., recently incorporated, has secured a nine-acre site on the West Waterway, on which a shipbuilding plant to cost \$250,000 will be erected. The plant will be in operation by Oct. 1, and C. O. Morrow, president, states that enough work has been contracted for to keep the plant busy for one year. It will be equipped to build wooden hull ships of any size, and will also specialize in repair work. The new company is an outgrowth of the Elliott Bay Yacht & Engine Company,

which has operated a small shipbuilding plant in the West Waterway for many years. The old plant will be kept in operation until the new one is completed.

The Fisher Flouring Mills, Seattle, has awarded contract for the construction of seven-story concrete and steel addition, 90 x 150 ft., to its plant on the West Waterway at a cost of \$400,000.

Mann & Fritz, Seattle, Wash., will establish a foundry in Seward, Alaska, to do general repair work.

The Pacific Sheet Metal Works has opened a sheet metal shop at 115 Pacific Avenue, Bremerton, Wash., with O. L. Harris president. It formerly operated in Seattle.

The West Kootenai Power & Light Company, Nelson, B. C., according to reports, will construct an addition to its power plant at Upper Bonnington Falls, which will generate 8000 hp.

The W. W. Wood Mfg. Company, Bellingham, Wash., has taken over the British-American Cedar Company's veneer plant in Bellingham. New machinery is being installed and extensions made.

The Davis-Scott Belting Company, Seattle, is constructing a plant at 308 First Avenue South, for the manufacture of oak leather belting, and will begin operation Sept. 1. This is the only plant of its kind in the Pacific Northwest. Charles R. Davis is president.

The Potter Lumber & Shingle Company's mill near Mill City, Ore., was destroyed in a recent fire, with a loss of more than \$40,000.

The mill of the East Kootenai Lumber Company, Nelson, B. C., was destroyed by fire with a loss of \$100,000.

## Canada

TORONTO, July 24, 1916.

Orders are continually being placed by the Imperial Munitions Board, of which J. W. Flavell is chairman, for the manufacture of shells and other war munitions. Authority for the placing in Canada by this board of further shell orders amounting to \$35,000,000 was received on July 18. This order is for 6-in. and 9.2-in. Edward Fitzgerald, recently of the Canadian Pacific Railway purchasing department, has been appointed assistant to J. W. Flavell, the chairman of the board.

While deprecating the excessive talk about the shortage of labor in relation to the harvest in the Canadian West, J. Bruce Walker, the Commissioner of Immigration at Winnipeg, Man., recognizes the seriousness of the situation and recently stated that it would be necessary for commercial and industrial undertakings to close down for a time in order to supply sufficient labor for removing the crops. This drastic remedy he considered the only way of placing the harvest in a position of security.

The great demand for paper is making it necessary for a large number of Canadian manufacturers to increase their plants. Among these companies the following increases are under way: The Donnacona Paper Company, Donnacona, Que., an increase of 50 tons per day; Laurentide Paper Company, 200 to 400 tons a day; Union Bag & Paper Company, Three Rivers, Que., a news-print mill of 100 tons daily capacity; Ontario Paper Company, Thorold, Ont., additions and new machinery; Abitibi Power & Paper Company, Ltd., Iroquois Falls, Ont., to purchase two 235-in. paper machines; Price Brothers & Co., Ltd., Kenogami, Que., an addition to cost \$500,000; International Paper Company, 30 Broad Street, New York, plans reported for a 200-ton news-print mill in Canada.

The plant of the O'Brien Munitions, Ltd., Renfrew, Ont., was destroyed by fire on July 16 with a loss of between \$100,000 and \$150,000. The plant will be rebuilt. This is the third fire at the plant in the past year.

The Stratford Brass Company, Stratford, Ont., manufacturer of brass fixtures, is building an addition to its plant, 42 x 42 ft., two stories. Alfred Hahn is manager.

The Harbor Commissioners, Toronto, have received a permit for an addition to the blacksmith and machine shop at the foot of Cherry Street, to cost \$2,700.

Large additions are being made to the boiler room and machine shop of the Canadian Northern Railway at Port Arthur, Ont. Six new stalls are also being added to the roundhouse. The company is also greatly extending its plant at Rainy River.

A. E. Ponsford, Ltd., has been awarded the contract for the erection of a new brick and concrete factory, 25 x 50 ft., for the American Brake Shoe & Foundry Company at St. Thomas, Ont., at a cost of \$17,000.

The Western Canada Marble & Tile Company, Ltd., Winnipeg, Man., has purchased a site at a cost of \$100,000

and will build a finishing plant, 52 x 175 ft. W. B. Purtell is president.

The Electro Steel & Metal Company has taken over a planing mill on Niagara Street, St. Catharines, Ont., and is equipping the building to be used in conjunction with its present plant.

The Eau Claire Waterworks Company, Tecumseh, Ont., has secured a site 50 x 125 ft., and will shortly call for tenders for the erection of a plant to cost \$20,000.

The Steel Company of Canada will build an addition to its plant at Toronto, to cost \$4,500. F. B. Cowan is branch manager. It has also awarded contract to William Yale, 24 Leeming Street, Hamilton, for the construction of an addition to its plant there to cost \$12,000.

The H. Morgan Company, Montreal, has commenced the erection of a garage to cost \$40,000.

Mr. Blachensky, St. Boniface, Man., proposes to build an abattoir and packing plant on Archibald Street to cost \$75,000. Plans have been prepared.

D. Balcovske, St. Boniface, Man., is contemplating the erection of an abattoir at the Union Stock Yards to cost \$65,000.

The W. J. Trick Company, Ltd., Oshawa, Ont., has received contract for the erection of a factory there for the Chevrolet Motor Company, to cost \$40,000. The Chevrolet Company will also build another structure there at a cost of \$50,000.

The Electric Products Company, Ltd., Three Rivers, Que., has been incorporated with a capital stock of \$95,000 by J. A. Oligny, G. D. Quillan, A. Boivin, and others, to manufacture electrical goods.

New Toronto, Ont., will purchase a pump for the waterworks plant, to have a capacity of 600 gal. per min. George D. Scott is clerk.

James, Loudon & Hertzberg, engineers, Toronto, are preparing plans for a water supply for Woodbridge, Ont., to include mains, pumping plant, filtration plant, stand pipe, etc., to cost \$40,000.

Stratford, Ont., will purchase a 10-hp. motor for the sewage disposal works. R. R. Lang is clerk.

Nesbitt & Co., Edmonton, Alberta, have been awarded contract for the erection of a machine shop there for the Canadian Northern Railway to cost \$65,000.

The Modern Tool Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of \$200,000 by Ismael J. Sarault, Louis P. Renaud, Joseph Peloquin, and others, to manufacture machinery, tools, arms, shells, ammunition, etc.

The Manitoba Steel Foundries, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$300,000 by Peter J. Smith, Arthur M. Tirbutt, Horace Ormond, and others.

The Superior Tile Company, Ltd., Montreal, has been incorporated with a capital stock of \$40,000 by Gaylen R. Duncan, Robert D. Sutherland, Frederick Babe, and others, to manufacture brick, tile, sewer pipe, etc.

## Government Purchases

WASHINGTON, D. C., July 24, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 9924, for one combined hand and power pipe cutting and threading machine to take pipes from 2½ to 12 in. in diameter, for Portsmouth, N. H.; schedule 9934, for one motor-driven test pump for Newport; schedule 9935, for four steam turbine-driven blowing sets for Charleston.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, July 18, for supplies for the naval service as follows:

### Schedule 9821, Construction and Repair

Class 34, Brooklyn—One hydraulic joggling press—Bid 107, \$8,135 and \$12,194; 152, \$5,700; 185, \$5,285 and \$4,950; 190, \$9,250.

### Schedule 9822, Steam Engineering

Class 41, Boston—Two air compressors with spares—Bid 127, \$3,667.60; 183, \$539.90.

Class 42, Boston—One pipe cutting and threading machine—Bid 82, \$1,719; 89, \$1,388.50; 107, \$1,500 and \$1,950; 132, \$1,950, \$1,500, \$1,700, \$1,561 and \$1,497; 178, \$2,761.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bids 82, Jarecki Mfg. Company; 89, Kemp Machinery Company; 107, Manning, Maxwell & Moore, Inc.; 127, Norwalk Iron Works Company; 132, National Electrical Supply Company; 152, Southwark Foundry & Machine Company; 178, Universal Trading Company; 183, Westinghouse Air Brake Company; 185, R. D. Wood & Co.; 190, Watson-Stillman Company.

## NEW TRADE PUBLICATIONS

**Air Compressors.**—Ingersoll-Rand Company, 11 Broadway, New York. Spanish catalog entitled "Productos de la Ingersoll-Rand." Size, 6 x 9 in.; pages, 124. Covers a line of air and gas compressors, vacuum, reciprocating and centrifugal water pumps, rock drilling, metal and coal mining, prospecting and quarrying machinery and pneumatic tools for machine and boiler shops and foundries. Illustrations, descriptive matter and tabulated data are included.

**Worm Drive Motor Truck.**—Federal Motor Truck Company, Detroit. Pamphlet. Size, 9 x 11½ in.; pages, 64. Deals with a line of worm-driven motor trucks and contains a collection of photographic reproductions showing some of the numerous uses to which they are put. Practically every class of service and raw material or manufactured product is covered by the illustrations. A general description of the engine and drive is presented followed by engravings and condensed specifications of different sizes of trucks that are built. A number of views of various styles of bodies are included.

**Engine Lathe.**—United States Lathe & Machine Company, Cincinnati. Circular. Treats of a 20-in. heavy duty screw cutting engine lathe that is equipped with a five-step cone pulley and a single back gear. An engraving and a condensed specification table of the lathe are presented with a brief description of its special features.

**Oxy-Acetylene Welding and Cutting.**—Searchlight Company, 415 Karpen Building, Chicago. Folder. Shows the different welding and cutting outfits that can be supplied with brief descriptions of the equipment furnished in each case. Attention is directed to the use of the apparatus in various fields of manufacturing and repair work.

**Speed Regulators.**—Goodman Machine & Tool Company, 50 Church Street, New York. Circular. Contains illustrations and a brief statement of the features of the Scriven speed regulator. The special advantage claimed is the absence of any intermediate disk, belt or friction mechanism, which enables any speed to be obtained within a ratio of 1 to 2½ and maintained as long as may be desired.

**Sheets and Sheet Metal Products.**—Reeves Mfg. Company, Dover, Ohio. Catalog. Size, 6½ x 10¼ in.; pages, 254. Describes and illustrates a line of metal sheets and the various products made from them. The materials listed include sheets, roofing and siding, eaves trough, conductor pipe, metal tile, tin plate, metal ceilings, stove pipes and elbows and a number of miscellaneous sheet metal products. The catalog is divided into sections, one for each line of products listed and in a number of cases the title page to the section contains reproductions of the method of manufacturing the particular article covered. A section devoted to the manufacture of genuine charcoal iron is included, together with one containing a number of tables of useful information.

**Poppet Valve Engines.**—Nordberg Mfg. Company, Milwaukee. Bulletin No. 28. Illustrates a line of poppet valve engines which includes three types, the full poppet, poppet-uniflow and poppet-Corliss. Following a discussion of the different kinds of engines and their construction, test results are given. A short discussion of the application of the engines to compressors, pumps and ice machines is given. Views of installations are given, together with engravings of details of the construction of the valves, valve operating gear, removable cages, cylinders, and head, the latter containing all the cored passages and ports and thus making the cylinder proper a simple cylindrical casting free to expand and contract with temperature changes. An illustrated description of two of the largest uniflow engines constructed in this country, which have been shipped to the Youngstown Sheet & Tube Company for driving rod mills, appeared in THE IRON AGE, July 20, 1916.

**Hydrostatic Instruments.**—Scientific Materials Company, Pittsburgh. Bulletin No. 4. Describes a line of hydrostatic instruments which includes pressure and draft indicators and recorders. The construction of these instruments, which are built on the same principle as the U-tube manometer, is gone into at some length and there are a number of views of the various instruments and tables of the different sizes that can be supplied are included.

**Payroll and Adding Machine.**—International Money Machine Company, Terre Haute, Ind. Catalog. Refers to a line of payroll machines which are designed to give the total of the payroll and the number of coins or bills of different denominations required to complete it, as well as delivering the money required to the envelope in the smallest number of pieces. A number of views of different types of machines supplement the description and mention is made of an adding and listing machine that has also been built. A partial list of users of the company's machines is included.



